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The Bancroft Memorial Lecture.

PROGRESS IN PROSTATIC SURGERY AT THE ROYAL PRINCE ALFRED HOSPITAL, SYDNEY, AUSTRALIA.[1]

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OF the troubles that afflict mankind in the autumn and winter of life, there is probably not one that interests a greater number of the medical profession than the disabilities following changes in the prostate gland.

The general practitioner has the responsibility of dealing with the acute obstructive symptoms; the physician sees the insidious changes in the cardio-vascular and renal systems associated with chronic prostatic obstruction, while it remains to the surgeon to try to extricate the patient from his dangerous position.

Although we have made great advances in the treatment of prostatic patients, we still must look upon prostatic disease as one of relatively high mortality. What we have reduced is the post-operative mortality only; the preoperative mortality is still high and has not been accurately estimated and as a rule is not sufficiently stressed in the published literature of the disease. Taking the disease as a whole, irrespective of operation, in those seeking admission to the Royal Prince Alfred Hospital the mortality rate is 18·8%, estimated upon statistics kept during the past twenty years. A surgeon by careful selection can make his postoperative mortality almost what he likes. There are several series recorded in the literature of one hundred and even up to one hundred and fifty consecutive operations with-

[1] Delivered at Brisbane on June 6, 1930.

out a death; but if a surgeon is obsessed with postoperative statistics, then he will fail in his duty to a great number of patients who could be relieved by a radical operation. The position is analogous to the radical operation for cancer of the uterus or bowel. The more experienced the surgeon, the more does he extend to patients advanced in disease the hope of a cure. Of necessity his post-operative mortality is greater than that of the surgeon who is less courageous. In the Royal Prince Alfred Hospital prostatectomy is performed by both general surgeons and urologists. The mortality rate of the general surgeons is 16·66% while that of the urologists is 20%. These figures are based on the last 150 patients operated on by the urologists. The general surgeons operated upon 114 patients during the same period.

No mortality figures can be accepted without consideration being given to the number of patients refused operation. The general surgeons refused operation to 26·1% of those patients admitted for treatment, four of whom had a persistent blood urea of over 100 milligrammes per 100 cubic centimetres. Urologists refused operation to 4·5% of all patients admitted for treatment, six of whom had a persistent blood urea of over 100 milligrammes per 100 cubic centimetres. In the Department of Urology it has been the custom to admit the straightforward "good risks" to the junior surgeons, while all the serious or "bad risks" are undertaken by the senior surgeon. The mortality rate of the junior surgeons is less than that of the senior surgeon; but one can scarcely argue that the junior is a better surgeon than the senior.

Since the formation of the Department of Urology five years ago it has been a definite policy to give as great a number of patients the chance of operative relief for enlargement of the prostate gland as was consistent with our knowledge for the time being of prostatic surgery. Instead of refusing relief to 26·1% of patients admitted, we now refuse only 4·5% without increasing the mortality rate to any striking extent.

The causes of death will be discussed at a later stage in this communication. To show that age in itself is no bar to operation, let us illustrate by saying that we have operated in the one week on two patients by methods that we have evolved, one eighty-four years of age with definite valvular disease of the heart, and one ninety-four. These two patients were both "bad risks," but were up out of bed in twelve days and thirteen days respectively after operation; their suprapubic wounds were healed and dry and they were emptying their bladders in the normal way. Both had acute retention and were relieved by an indwelling catheter for fourteen days and thirty days respectively. Their renal function was just up to a minimum standard before operation. After the risks were explained, both these patients elected to be operated on rather than face a catheter life or a permanent suprapubic drainage tube. They were not only rewarded for their courage, but definitely advanced prostatic surgery for their fellow sufferers. They are the oldest in our series.

Even a few years ago we could not have given these two men a chance of a radical operation, but we have gradually developed a system of treatment, preoperative, operative and postoperative, that encourages us to extend our definition of what is a safe risk. The main influence to make us change our views is a reduction of the postoperative morbidity. We are now getting men up out of bed in two weeks or less instead of the four to six weeks or longer as we formerly did. One man was up with his suprapubic wound healed on the tenth day. He had his indwelling catheter, the only means of post-operative drainage, removed the day before and passed his water normally. We are inclined to consider this an irreducible minimum. These results have been repeated so often during the past year that we are encouraged to hope that suprapubic prostatectomy will be raised to as safe or even to a little safer plane than any other major operation on patients of a similar age.

After all, it is to be remembered these patients are past middle life when the degenerative changes of age, irrespective of their disease, undermine their powers of resistance. The postoperative mortality after any major operation in these patients must be in the neighbourhood of 5% at least. Hunt, of the Mayo Clinic, as recorded in the "Collected Papers of the Mayo Clinic" of 1927, has shown that postoperative mortality in prostatectomy has a direct relationship to the age of the patient. In patients under sixty-five years the mortality was 3·9%, say 4%. Over sixty-five it was 6·5%. Between seventy-five and eighty it rose to 15%, while in those over eighty it was 17%. Our experience confirms these findings; but if the morbidity or, in other words, the bedridden period after operation can be reduced and the patients safely got out of bed in two weeks or less, then our experience would lead us to think that post-operative mortality can be reduced. Several factors enter into the reduction of post-operative morbidity. If the bladder can be drained after operation by an indwelling catheter only, the delay in healing caused by a suprapubic tube is avoided. Until the last two years we always used suprapubic drainage after operation, but all the years that we did so we did not recognize that instead of avoiding sepsis the tube was the cause of sepsis. There are plenty of Australian surgeons living today who have had the experience of draining by rubber tube of large diameter an uninfected hydatid cyst after marsupialization. If the temperature chart of such a patient is looked at, it is evident that it remained undisturbed after the first twenty-four hours until about the fifth day, when the characteristic saw tooth line of sepsis would appear. Coincident with this would come the smell that was unmistakable. It was known as the hydatid stink. We thought then that such a smell was part of the disease instead of part of the treatment. Since uninfected hydatid cysts have been closed immediately it has been demonstrated that they can heal

without sepsis or smell. If in a suprapubic prostatectomy the wound can be closed and the bladder drained with only an indwelling catheter, gross sepsis can be avoided and the wound heals practically by first intention. Just as in the hydatid cyst, the drainage tube is the cause of inevitable postoperative sepsis, not the preventer of sepsis. To arrive at a stage at which the bladder can be safely closed, is a matter of evolution, not revolution, in methods of treatment.

The steps of the evolution would take too long to tell in detail, but it would cut a long story short if the methods that we use today are given with an occasional comparison of the methods that have been superseded.

At one time we did not fully realize the responsibility of passing a catheter into the virgin cavity of the bladder of an elderly man, the subject of prostatic obstruction and retention of urine. We are inclined to think that it is comparable to the responsibility of opening his abdomen. Careless technique may assuredly cause the death of the patient. If the patient died within a few days after the passage of the catheter the cause of death would be recognized; but because the patient survives for two to three weeks or longer only to succumb to pyelonephritis, the one who is really responsible for the death escapes the blame. Even when a bladder is already infected, the responsibility is equally great in relieving retention of urine by catheter. Although the patient has become immune by autoinoculation against the organisms already in the bladder, yet the introduction of a new organism may find the patient quite defenceless against its attack; in fact his defences may be undermined by the existing infection.

We all have met the man with an enlarged prostate who keeps his bottle of slightly rancid olive oil in one pocket while in another rests his battle-scarred catheter coiled up in a tobacco tin, or maybe in his hat. He has had a strong influence in keeping up the irresponsible attitude towards the passage of a urethral instrument. We meet only the survivors, the dead cannot speak.

It is easy to cleanse the *meatus urinarius* with alcohol; then a boiled olivary tipped coudé rubber catheter of the Tiemann pattern can be grasped with the fingers in a small square of sterile gauze and passed into the bladder without being contaminated. The catheter is lubricated freely with a water-soluble antiseptic lubricant. It can be obtained impregnated with oxycyanide of mercury of a strength of one in two thousand and can be purchased in collapsible tubes under the name of "Lubafax." The sterile gauze squares, about 7·5 centimetres in diameter, can be packed and carried in a metal box with a tight-fitting lid. The top square of gauze can be lifted out without soiling the next. These instructions may seem elementary, but we have found them useful in instructing patients who have had to catheterize themselves. With this simple method it is possible to exclude organisms from the outside, but we cannot exclude the organisms that may be already in the urethra. These are carried into the bladder by the catheter. Fortunately the patient is, as a rule, immune to these organisms which are usually of a mild type.

We are convinced that in practice, with all the care that we can take, a patient who has to be routinely catheterized, inevitably becomes infected after a few days. It is unfair always to blame the nurse for a cystitis that develops in a patient who has to be catheterized for postoperative retention of urine.

In spite of our present views we do think that it will be possible to develop a technique that will eliminate the danger of catheterization in prostatic surgery. In a public hospital with a numerous and ever-changing staff the problem is more difficult to control. In private hospital where one nurse is assigned to one patient, the incidence of accidental infection by catheter is not so great.

In earlier years we looked upon prostatic obstruction as a purely mechanical hindrance to the passage of urine, much in the same way as a stricture of the urethra. We did not realize that coincident with the progressive obstruction there was a progressive and inevitable descent from the high level that we call health, to the low level that we call disease. This downward progress is brought about by degeneration of the whole bodily functions. At first the kidneys are affected, then the heart and blood vessels and through them the evil influence is spread to each and every organ of the body

The extent to which the functions of the body have been interfered with, we can measure with a fair degree of accuracy in so far as the renal and cardio-vascular system is concerned; but the more insidious changes that take place in the digestive, central nervous and locomotor system, we can gauge only approximately by a general examination of the patient. We have received much help in deciding matters of this kind from consultations with our physician colleagues.

One of the reasons of the high postoperative mortality in the early days was the failure to recognize the loss of renal function that occurred in long standing prostatic obstruction. We now measure the renal function before operation and have accurate standards to guide us in avoiding postoperative uræmia.

We test the renal function on admission and every few days subsequently until we are satisfied that it is safe to operate. At first, on insertion of the indwelling catheter, the renal function drops, then after about five days it begins to rise and steadily continues to do so in favourable cases until the required standards are reached. We do not adhere to a single method; we estimate the nitrogen in the blood in the form of urea percentage; we also measure the percentage of urea excreted in the urine after the administration of a measured quantity by mouth, according to the method of McLean. These two methods we adhere to in public hospital, but in private hospital we use in addition the phenol-sulphonephthalein test of Rowntree and Geraghty.

After some years of experience in all three tests we find them all reliable. We do not care to operate on a patient whose blood urea is over fifty milligrammes per hundred cubic centimetres of blood, nor on one whose output of urea is less than 1·7%. The minimum phenolsulphonephthalein output we have standardized at 20% in the first two hours. What is equally important in the last test is that the dye stuff output remains constant or increasing and that the output in the first hour is greater than that in the second hour. In exceptional cases we have operated on patients with an output of only 5%, but these are patients who have failed in one month to come up to the minimum standard of 20%. They have been sent out with a permanent suprapubic tube to wait for three or even six months or longer before coming up for reexamination.

In spite of all laboratory tests the general appearance of the patient must satisfy the clinician. If the patient eats well, sleeps well and looks well, we never hesitate to give him the chance of operative relief, even if the laboratory findings should only reach the minimum standard.

During the period of preparation it is not uncommon to see the patient lose his appetite, develop a hiccup and sometimes vomit. This clinical evidence of uræmia we combat with diuresis induced by copious draughts of water.

With the advance of years we have become much more critical in the standard of diagnosis of the nature of the obstruction produced by changes in the prostate gland. All workers in this field of surgery were satisfied to estimate the prostatic obstruction by a digital examination through the rectum. Valuable as this method is, there exists quite a fair percentage of cases in which no enlargement is to be felt *per rectum*, and yet the patient has marked difficulty in passing urine or even acute retention of urine. We are not satisfied unless a routine cysto-urethroscopic examination is made or attempted. If the cystoscope fails to pass then, although sight of the obstruction is denied us, tactile sensation conveys something of the nature of the obstruction, much as one gains information by the probing of a long sinus. If the cystoscope does not pass by gentle manipulation, no attempt is made to force a passage. We have seen patients who have been admitted under our care and in whom a metal catheter has been forcibly used, and it has entered the bladder by perforating the enlarged prostate; in other cases the catheter has perforated the posterior part of the urethra and entered the perivesical areolar tissue without entering the bladder at all.

In using the cystoscope, we do not confine ourselves to one type of instrument. The indirect instrument, after insertion into the bladder, is used in eight positions, anterior, posterior and two lateral which would correspond to north, south, east and west. In addition to these, four diagonal observations are made and still using the compass analogy these would be north-east, north-west, south-east and south-west. From these observations an outline of the enlarged prostate is plotted on a suitably prepared chart according to the method of Young. The surgeon then knows just what has to be met with at the operation. This method of examination is all that is required in the adenomatous type of enlargement where there is an intravesical projection of the enlarged lobes. A cysto-urethroscope is used when the enlargement does not project into the bladder, but into the posterior part of the urethra. Then it is determined which of the lobes is the obstructing factor. Sometimes it is one and sometimes it is all lobes that project into the posterior part of the urethra and block the urinary outflow. A vivid impression is gained in these intraurethral obstructions of the mechanism of obstruction. As the urethroscope is withdrawn, sometimes the two lateral lobes bulge into the field of observation exactly like the two locking gates of a river dam.

In those prostatic obstructions that are not associated with enlargement of the gland, an accurate visual picture is seen at the vesical neck of a contracted orifice or a bar formation. This type of obstruction is best dealt with by means of an intraurethral prostatotomy or punch operation followed by diathermic control of the hæmorrhage. The electrode is passed through a cysto-urethroscope and the bleeding point touched. Recently we have been dividing some of these obstructions with the endothermic cutting knife after the method of Clyde Collings. Pathological examination of the tissue removed shows that these obstructions are mainly inflammatory in origin. The inflammatory tissue is intermingled with hypertrophied, non-striped muscle in quite a number of instances.

The last type of obstruction, due to the malignant prostate, is as a rule seen in the later stages and the diagnosis is then fairly easy. The determination of malignancy is still largely dependent on the digital palpation of the gland through the rectum. The induration of a chronic prostatitis is quite difficult at times to differentiate from an early malignant prostate. In cases of doubt we wait and keep the patient under observation. The cystoscopic evidence in malignant disease of the prostate is not sufficient in itself to enable us to arrive at a diagnosis unless the growth has actually broken through into the vesical cavity and formed a characteristic malignant ulcer or sessile papillomatous growth. Sometimes the process is reversed; the malignant change is primarily in the mucous membrane of the bladder near the vesical orifice and invades the prostate by direct extension.

In all obstructions due to prostatic changes there is an accompanying hypertrophy of the bladder wall, varying in degree according to the obstruction. Care has to be exercised in differentiating these changes which bear a superficial resemblance to the changes brought about by disease of the central nervous system.

A routine Wassermann test is a help in making a decision; but we have to remember that patients

who have tertiary syphilis, have sometimes typical adenomatous enlargement of the prostate gland; these patients are relieved by operation, while those who have a "cord" bladder without endoscopic evidence of a prostatic obstruction, are made worse by any attempt at operative intervention. The obstruction in these cases is due to a want of coordination of the nervous mechanism which controls the detrusor muscle and that which controls the sphincter.

At first we used to find that many patients were intolerant of the indwelling catheter, but we now find that if care is exercised in choosing a suitable size to fit the individual urethra, very few complain. We also find that it is useful to keep prostatic patients at varying stages of treatment in contact with one another. The human spirit of rivalry helps to dissipate the discomforts that would be magnified were the patient alone. Even when the renal function is good at the first test, we make it a rule to extend the preliminary catheterization for a period of ten days. When necessary, the period is further extended. If after a month the renal function fails to come up to a safe standard, we insert a permanent suprapubic drain under a local anæsthetic. In three to six months the patients may return with a good function and are given the option of a radical operation. During the pre-operative preparation we allow the patient to get out of bed with a removable plug in the distal end of the catheter.

We do not make a practice of routine vasotomy. We have found that if an easy fitting catheter is used and changed once every four days, the incidence of epididymitis is much reduced. If the catheter is not changed every four or at most five days, a traumatic urethritis is set up. This inflammatory process may then extend to the genital tract and epididymis.

Much stress has been laid upon the necessity of emptying an over-distended bladder gradually; also of decompressing the kidneys by gradually lowering the level of the vessel arranged to collect the urine. Our experience would lead us to think that these dangers have been overemphasized. We have now gone back to the sudden emptying of the distended bladder and also to the placing of the collecting vessel for the indwelling catheter at floor level immediately after insertion of the catheter. We have not noticed any difference in the results of our present practice compared with the days when we used all the standard precautions. We feel that many practices in surgery are fashions and come in cycles. We are quite prepared to return to all the standard precautions if evidence justifies it.

In the earlier years of prostatic surgery acute retention of urine was the main indication for a radical operation and still is one of the main reasons; but as our post-operative results have improved we have extended the indications. The amount of residual urine has always been some help in deciding upon a radical step, yet some patients who have a great deal of discomfort in the form of hesitation and difficulty in passing urine accompanied by nocturnal frequency have no residual urine. The actual size of the gland is no guide; a relatively small gland may cause obstruction where a large one will produce none. In the end the personal discomfort of the patient, irrespective of age, is the strongest indication for operative interference, particularly if this is accompanied by lowered renal function. An endoscopic review of the bladder and posterior part of the urethra will determine the type of operation indicated. If in a routine examination we find that the prostate is enlarged, that renal function is reduced by approximately one-half when tested by the phenolsulphonephthalein method, that is, below 30%, although there is no personal discomfort, then we point out to the patient the danger of his position and recommend operation.

Although Bellfield, of Chicago, and McGill, of Leeds, quite independently in 1887 did the first deliberate suprapubic prostatectomy, the one in America, the other in England, it was Freyer who developed the operation in the year 1900 and placed it amongst the sound surgical procedures.

In the Royal Prince Alfred Hospital in the year 1894 when I was a resident, I assisted Sir Alexander MacCormick at the first suprapubic prostatectomy performed in Australia. This operation was carried out in a single stage after the bladder had been opened suprapubically to relieve acute retention. When the bladder was being explored by the finger, the form of the obstruction at the vesical neck suggested to the operator the possibility of enucleation. This was carried out successfully. A middle lobe and two lateral lobes were removed in one mass. The patient did well for about one week; but septic infection of the bladder and abdominal wall by a urea-splitting organism led to eventual death of the patient some six weeks after operation.

After the publication of Freyer's operation Critchley Hinder, Honorary Surgeon, took up the work enthusiastically at the same hospital. When I was his Honorary Assistant Surgeon, I had on frequent occasions the duty of stopping post-operative hæmorrhage in the middle of the night following the operation by packing the prostatic cavity with long strips of gauze.

In 1908, after seeing Fryer in England and Young in America, I took up the work myself. Since that year I have participated in the progress of prostatic surgery. Young introduced the perineal method to the profession as Freyer did the suprapubic, but he did more, he emphasized the importance of the surgeon being able to see every step of the operation that he performed. In his and his disciples' hands the perineal operation is a demonstrated success. Stimulated by Young, advocates of the suprapubic route began to develop methods whereby they could avoid the blind and bloody paths that they had previously followed. In 1916 Judd and Thomson Walker independently, then some few years later Hunt, of the Mayo Clinic, developed an open operation where every step that was taken was under the

control of sight. Hæmorrhage was arrested by suturing the vesical neck by special methods supplemented by a gauze pack or the Pilcher rubber bag. Both, however, drained suprapubically as well as by the urethra.

Lower, of Crile's Clinic, in 1927, in certain cases of suprapubic prostatectomy, advocated the immediate closure of the bladder with drainage through the urethra only. He was met with a storm of opposition; but our experience would lead us to believe that Lower is right and that advance in prostatic surgery will take place by immediate arrest of hæmorrhage and closing the suprapubic wound. Drainage through the urethra by an indwelling catheter is possible only when bleeding and the formation of blood clots are not allowed to take place. Closure of the bladder with the object of primary healing is possible only where urethral drainage through a catheter is free. Since the publication of Lower's work Harry Harris has reported a series of successful results in suprapubic prostatectomy with immediate closure of the bladder. He, however, still adheres to the bimanual removal of the enlarged gland. In our work in the Department of Urology which was formed five years ago, we at first departed from the Freyer one-stage operation by dividing it into two stages, a preliminary cystostomy followed by removal of the prostate ten to fourteen days later. Bleeding was controlled only by pressure temporarily applied to the vesical neck with a gauze pad held in a sponge forceps. The large drainage tube that was used allowed blood and blood clots to escape easily. We returned again to a one-stage operation four years ago when we found methods of using the indwelling catheter that were tolerated by the patient. The next step in advance was the control of hæmorrhage by packing gauze into the prostatic cavity and leaving it there for three to four days. Later an indwelling catheter was passed and gauze packed around it, still using the suprapubic tube as a supplementary drain. In some cases the postoperative drainage took place entirely through the urethral catheter, so we began to leave out the suprapubic tube a little over two years ago, but still adhered to the gauze packing of the prostatic cavity. Influenced by Thomson Walker and Hunt, our next endeavour was to develop the open operation with everything done under sight from above. Success in this technique followed; but we still found it necessary to use a light gauze packing to control the hæmorrhage from the prostatic cavity. We then developed a method of suturing the vesical neck to control hæmorrhage that differed quite distinctly from other methods described. We were then in a position to do without gauze packing to control hæmorrhage. With this point gained, it was easy to go forward to the next logical step of closing the bladder.

Within the last year we have developed still further refinement in the treatment of the vesical neck. The mucous membrane covering the enlarged prostate is saved by cutting a flap from that covering the middle lobe; this flap extends into the posterior part of the urethra. The lateral and anterior mucous membrane of the posterior part of the urethra is stripped from the underlying prostate gland and divided about six millimetres (a quarter of an inch) distal to the vesical orifice. If we wish to avoid postoperative contracture at the site of operation anywhere in the body that involves a mucous surface, we try to save as much of the mucous membrane as possible. The success of the modern operation for removal of tonsils is based on this principle. We believe that this saving of the mucous membrane at the vesical neck and posterior part of the urethra hastens the postoperative restoration of those parts; further, we believe that it will lessen, if not prevent, the late postoperative contracture of the vesical neck. The transformation in the postoperative history since we attained the objective of closing the bladder is nothing short of amazing. Before the period of immediate closure of the bladder it was distressful to watch the discomfort, shock and pain that the patient went through for the first few days; now it is a usual thing to find the patient reading the paper the day following operation and that he has had a comfortable sleep. This state of comfort remains throughout the convalescence until the indwelling catheter is removed on the eighth or ninth day. The patient is then allowed up out of bed in ten to fourteen days. Occasionally the catheter has to be reinserted for a few days until the suprapubic wound is dry.

This is the bright side of the picture. There is another side; every now and again we fail to get these results because of sepsis. In the early days of our prostatic surgery we lost a number of patients from postoperative uræmia, but we now know how to combat its onset by suitable preoperative treatment. We have, however, a considerable way to go before we can eliminate sepsis before and after operation. An indication has already been given how sepsis of the urinary tract occurs by instrumentation before operation. We have seen a man come into hospital with prostatic obstruction and be put through the preparation for operation in the usual way; at the end of ten days a rise in temperature took place with a slight initial rigor. Up to that time his urinary function and general condition were improving. With the onset of rise in temperature his blood urea began to rise; a week later he was dead. Just before his death his blood urea reached 400 milligrammes per hundred cubic centimetres of blood. *Post mortem* there was a small pressure ulcer of the middle lobe produced by the indwelling catheter. Underneath this ulcer was a minute abscess; the upper part of the urinary tract showed bilateral acute pyelonephritis with small cortical abscesses.

The same series of events we have seen happen postoperatively. One man was out of bed in fourteen days with his wound healed and passing his urine normally. A slight leak developed in the suprapubic wound, necessitating the reinsertion of his catheter. Inside twenty-four hours he developed a rise in temperature, his suprapubic wound broke

down and in a fortnight more he died with an *ante mortem* increasing blood urea. *Post mortem* he had marked pyelonephritis. We could not but feel that sepsis was introduced on reintroduction of the catheter.

When suprapublic drainage was our custom, there was another type of sepsis which occurred not in the urinary tract, but in the great areolar space which surrounds the bladder and the prostate. A direct extension of the same areolar space surrounds the ureters and extends right up to the kidneys. Professor Tandler, of Vienna, first pointed out the importance of this space and called it the *tela urogenitale*. In *post mortem* specimens I have seen suppurative infection of this space extending right up to the kidney. Sometimes the infection started in the space of Retzius, at other times in and around the prostatic cavity. Since we have made closure of the bladder a routine step at operation, this form of sepsis has become almost a rarity. Our views on the relationship between sepsis and suprapubic drainage have already been expressed in an earlier part of this communication.

In reviewing the causes of the seventeen deaths among the last 104 patients operated upon, they were classified under the following heads:

Pneumonia	2
Mesenteric Thrombosis	1
Uræmia	1
Pyelonephritis and pelvic cellulitis	13
Hæmorrhage	0
Total	17

If the deaths from sepsis were eliminated, the mortality would be less than 4%.

During the treatment of the last hundred patients eleven were selected at random and not consecutively. They were taken in charge by one of the fellows in urology and all the preoperative and postoperative care was carried out by him. One death on the third day took place from mesenteric thrombosis, all the other patients recovered without any septic complications whatsoever. The survey of this series has just been completed. As a result of this information steps have been taken to make radical alterations in the methods of preoperative and postoperative care.

Billroth, the great pioneer of gastric surgery, in describing his work, said: "All my patients leave the operating table in shock from which some recover." He had the courage, however, still to go on and today we see the fruits of his labours; gastroenterostomy in the hands of a capable surgeon is one of the safest major operations in surgery.

Just as we have lived to see the dangers of gastric surgery removed, so do I think we will live to see the septic dangers removed from prostatic surgery. The problem is more difficult, but all the more worthy of being solved. Lister in his day solved greater problems by the antiseptic methods of offence. If we sit at his feet once more and learn again the lessons he taught us, we are more likely to be successful in prostatic surgery than if we practise the precepts of the purely aseptic school that followed him.

It has been our privilege to watch and participate in the progress of prostatic surgery for a period of over thirty years. We have helped to evolve from the crude, blind operation of the early days a scientific procedure where every step is taken under vision, a precise anatomical dissection. We have seen and helped in the disappearance of the painful gauze pack and rubber bag to control hæmorrhage. In their place, aided by sight, we have stopped the hæmorrhage, as we stop it at operation anywhere else in the body. With this achieved we have reached the point where we can close the bladder as we can close the peritoneal cavity and expect primary healing. While we can rigidly guard against the entry of sepsis at the time of operation, yet our defences are weak before and after this event. When the gloomy shadow cast by sepsis can be dispelled, we will enter brighter days. We are just at the dawn of the first day of a new era in prostatic surgery.

FISTULA-IN-ANO.[1]

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IN selecting this subject for my address this evening I do so in the hope that added interest may be shown in attacking a problem which is in the main a preventible one. The fact that practically every fistula follows either non-treatment or treatment along incorrect lines of an abscess in the anal region speaks for itself. Thirty-eight out of one hundred and two patients with fistulæ treated at Saint Mark's Hospital, London, in 1928, had had previous operations, whilst fifteen out of forty-one patients (37%) treated at the Perth Hospital in the last five years had also been subjected to previous operations which had left them unrelieved. Cases such as the following are still unfortunately all too frequent.

G.S., a male, aged fifty-eight years, during the last thirty years has had eight operations for abscesses in the anal region. On examination three or four scars could be seen of old incisions on either side, lateral to the anus and about 2·5 to 3·75 centimetres (one to one and a half inches) from its margin. Digital examination revealed an internal opening posteriorly between the internal and external sphincters with a complete posterior horseshoe fistula terminating antero-laterally in the region of the scars on either side.

Though one must admit that in the intervals between these inflammatory attacks this patient suffered little inconvenience, yet one is unwillingly led to the conclusion that in such cases either the technique of examination of a rectal condition is faulty or else the method of operative attack is unsound, or both.

[1] Read at a meeting of the Western Australian Branch of the British Medical Association on April 16, 1930.

HISTORICAL.

Though probably inflammation in the region of the anus has inflicted its disabilities on mankind since he assumed the erect posture, and the operation for fistula was apparently cited as early as 2,200 B.C. in the Code of Hammurabi, the earliest works to which I wish to refer in any detail are those of Hippocrates who, as you probably know, was born about the year 470 B.C. and was the second of at least five men bearing that name, and who is now known to us as "The Father of Medicine." Mythical genealogy traces his descent from Æsculapius, concerning whose origin an extraordinary number of diverse traditions have arisen, one showing him to be the son of Apollo by the nymph Coronis. With such a lineage it is little to be wondered at that he seems to have formed a very correct conception of this disease amongst others and to have evolved very rational methods of treatment.

He attributed fistulæ to tubercles and contusions in the anal region caused by riding and other forms of violence. Following the injury blood collected and suppurated, eventually bursting through the skin, leaving a fistula. It is now that we see the wisdom of Hippocrates, as he advised the surgeon to make an incision whilst the tubercle was still unripe and before suppuration was apparent. (How often do we carefully place the patient in bed and foment his perineum, awaiting anxiously the fluctuation which is so tardy in manifesting itself, and yet which so often, after waiting in vain, "bursts" before we can bring ourselves to open it!) Should a fistula have formed, then he recommended that it be probed with a stalk of fresh garlic to gauge its extent. In treating a fistula he first described a method of dilatation of the track by means of a tent of cloth smeared with a caustic which was passed along the track into the rectum; but he then went on to describe a method of operation by means of a ligature. The underlying principle was the passage of the ligature from external to internal opening, and by its gradual tightening, to cut open the fistula, to the open track of which he then applied mild escharotics. Should the fistula not admit of this treatment, he then suggested syringeing with myrrh or other solutions through the external opening which he kept patent by means of a piece of metal (insuring adequate drainage). Once more in his wisdom he observed that such tracks do not heal, unless they be cut open.

The operation of ligature, with but few modifications, has been handed down in the writings of Celsus (25 A.D.), Paulus Aeginata (625-690 A.D.), Albucasis (eleventh century), John Arderne (1307-1377 A.D.), Peter Lowe (1612) to quite modern publications.

Let us pause to examine the works of John Arderne. He was an Englishman holding a position similar to the consultant surgeon of the present day, being a member of the Guild of Master Surgeons in London, and he has left behind him an excellent treatise on *fistula-in-ano*. He lived in what was most probably the most chivalrous period of English history, a period in which, alas, *fistula-in-ano* was all too common. It comes as something of a shock to realize that whilst the "flower" of chivalry sat, heavily armoured in the saddle, often in the wet, planning those mighty ventures, the contemplation of which so thrilled us in our youth, they were in reality probably mostly hatching ischio-rectal abscesses and other inflammations in this region, much to their discomfiture and much to the despair of their medical advisers. Indeed, at the time of Arderne complete fistula was considered by many to be incurable.

Arderne, however, placed his patients in the lithotomy position and then passed a probe, the *sequere me*, through the fistula from external to internal opening. He then threaded a ligature, the *frænum Cæsaris*, through the eye of the probe which was then completely drawn through the track, the two ends being knotted together and the ligature tightened by means of a peg, the *wrayste*, fixed into a gorget, the *tendiculum*. The gorget was now pushed well into the fistula and a grooved director, the *arcus rostrata*, passed along it so that it projected into the rectum along the track taken originally by the probe. A shield, the *cochlearia*, was then inserted into the rectum to protect it and then a lance was passed along the groove in the director and the track cleanly incised. Should the patient, emulating Oliver Twist, still ask for more, then the other tracks were laid open as much as possible. In his after-treatment Arderne was five hundred years before his time, as he did not use the corrosive and irritating treatment considered so necessary by his contemporaries, and, as we ourselves know, the secret of success lies in the recognition of this very fact in the after-treatment of this condition.

DEFINITION.

By the term *fistula-in-ano* is meant a granulating track opening into the rectum or into the skin in its vicinity, or both. As it always follows abscess formation in the region, it has been described as a contracted but unobliterated abscess cavity which has not healed.

ANATOMICAL AND PHYSIOLOGICAL CONSIDERATIONS.

Before proceeding further there are several anatomical and physiological considerations which deserve our attention.

An examination of the rectum and anal canal shows the muco-cutaneous junction (the white line of Hylton) to be situated just proximal to the upper border of the external sphincter, between it and the internal sphincter. In this region are to be found the sinuses of Morgagni; and recently intramuscular glands communicating with the submucous tissue in the region of the lower end of the rectum and anal canal have been demonstrated in the internal sphincter.

Not only is the muco-cutaneous line at the area of the greatest narrowing of the large bowel, that is, between the two sphincters, but it is also at the most sensitive; and it follows that the passage of any hard, sharp or chemically irritating material

through this area will result in involuntary contractions of the sphincters, further constricting an already narrowed portion of the bowel.

Three muscles concern our study of the pathology of fistula.

The first or internal sphincter is really the circular muscular coat of the rectum which is thickened at its lower end, and as such it is not a definite sphincter, its nerve supply and functions being those of the circular fibres of the colon and rest of the rectum.

FIGURE I.

Dissection showing the relationships of the muscles at the anal canal. (A window has been cut in the mucosa of the rectum exposing the internal sphincter muscle.) 1 = internal sphincter muscle; 2 = external sphincter muscle. 3 = *Levator ani* muscle; 4 = muco-cutaneous junction, showing the sinuses of Morgagni.

An appreciation of the second or external sphincter, however, is most important in rectal surgery. It arises as a definite entity from the tip and sides of the coccyx and the adjacent fascia, passing forwards to the posterior border of the anal margin, where it divides to surround the anal orifice, reuniting at its anterior margin where it becomes intimately associated with the transverse perineal muscles, and in women also with the fibres of the *sphincter vaginæ* muscle. It is a definite muscular band with a nerve supply from three sources, the third, fourth and fifth sacral nerves, internal pudic nerves and also the fifth and sixth sacral nerves. It is fixed anteriorly and posteriorly, but laterally can be easily seen as an unsupported muscular band which on division will retract markedly, much in the same manner as would an extended rubber strap. The muscle is normally contracted and relaxes voluntarily. Proper control of the contents of the lower bowel depends on the integrity of this muscle and too great care cannot be shown when operating on or in the vicinity of this muscle.

The third muscle of importance is the *levator ani* which is a broad sheet of muscle fibres arising anteriorly from the *symphysis pubis*, laterally from the pelvic fascia along the line of its attachment with the obturator fascia and posteriorly from the spine of the ischium on each side. The two muscular sheets pass down to surround the rectum posteriorly, becoming intimately associated with the musculature of the rectum itself and interlacing with the fibres of the internal sphincter. Posteriorly, some fibres pass on to the anterior aspect of the coccyx, whilst anteriorly they surround the prostate in the male and become associated with the *sphincter vaginæ* muscle in the female.

Surrounding the anal canal and lower part of the rectum is to be found in the ischio-rectal fossa a pad of loose, cellular, fatty tissue of relatively low vascularity and vitality which permits of variations in calibre and of movements of the organs of the pelvis. The deep fascia in this region passes deeply, lining the deep surfaces of the fossæ, leaving practically an absence of any boundary to check the

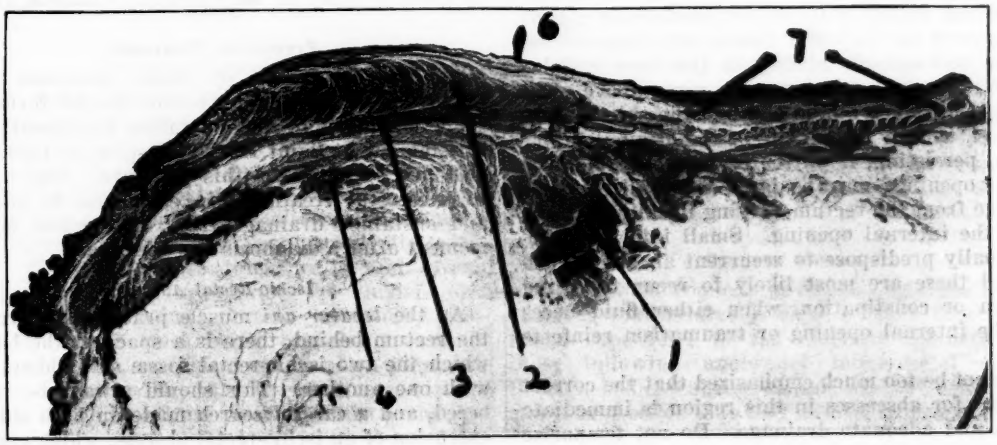

FIGURE II.

Longitudinal section through rectum and anal canal cut by Mr. Mitchell with Sir Lenthall Cheatle's microtome. 1 = *Levator ani*; 2 = internal sphincter; 3 = prolongation of longitudinal muscle of rectum; 4 = external sphincter; 5 = ano-cutaneous line; 6 = ano-rectal line; 7 = hæmorrhoidal plexus.

spread of inflammation in the cellular tissue of the ischio-rectal fossa which is thus directly continuous with the subcutaneous fat of the body. Further, a normally poor blood supply is still further embarrassed on assuming the sitting posture.

ÆTIOLOGY.

Fistula is much more common after the age of thirty years and it is much more common in men than in women. Certain occupations seem more prone to the disease, especially those entailing much sitting, such as tailors, bus drivers, clerks and horsemen.

The commonest causes are fissure-in-ano, ischio-rectal abscess, tuberculosis, stricture of the rectum, foreign bodies either causing trauma to the rectal mucosa or becoming embedded in it, other injuries to the parts and finally necrosis of the pelvic bones. About one-third of all rectal cases are fistulæ and the incidence seems to be diminishing. Greater cleanliness and the use of more suitable toilet paper, involving a minimum of trauma, have, I am sure, played a not insignificant part in this decrease.

Fistula practically always results from abscess or inflammatory changes in the region of the rectum, and characteristically tends to spread, the longer it is left untreated. The correct treatment and cure of abscesses in this region would thus immediately reduce the fistula rate, and we must look on fistula as an almost entirely preventible condition.

The site of origin of nearly all acute ischio-rectal and peri-rectal abscesses is the bowel, at the position of the muco-cutaneous line. Should a foreign body perforate the bowel at a higher or lower level, the abscess would commence at the site of the perforation. In many cases the development is as follows:

The patient, when straining to pass a hard, constipated or a loose, irritating stool, associated with tenesmus receives a small tear or wound in the mucous membrane, at the point of greatest resistance which has been shown above to be at the muco-cutaneous junction. Infection spreads to the submucosa and probably to the intramuscular glands and thence to the peri-anal tissues where an abscess develops and spreads readily in the loose cellular tissue for the anatomical reasons given above. The abscess then either bursts through the skin or into the bowel, usually at the site of the original injury or both, persisting, if untreated, as a fistula. The internal openings may be large or small, the pus discharge from the rectum varying usually with the size of the internal opening. Small internal openings usually predispose to recurrent abscess formation and these are most likely to recur following diarrhœa or constipation, when either fluid fæces enter the internal opening or traumatism reinfects it.

It cannot be too much emphasized that the correct treatment for abscesses in this region is immediate incision and adequate drainage. Do not temporize with foments and other expectant treatment if an abscess is suspected. At Saint Mark's Hospital all abscesses are treated as emergency conditions and are incised as soon as the patient can be prepared for anæsthesia. Owing to the anatomical peculiarities of the area, an abscess may have reached considerable dimensions and yet show but little swelling and very little redness. The only early signs are often pain and local tenderness associated with general malaise and heightened temperature. Gentle palpation with a finger in the rectum and the thumb outside showing induration and marked tenderness on palpation are sufficient to warrant an incision which should be performed under adequate anæsthesia and with due regard to asepsis. I have found spinal anæsthesia to be very satisfactory in these cases, especially in the presence of bronchitic tendencies in stout patients. Even the obtaining of a small amount of sero-pus justifies the incision and if nothing is found very little harm has been done.

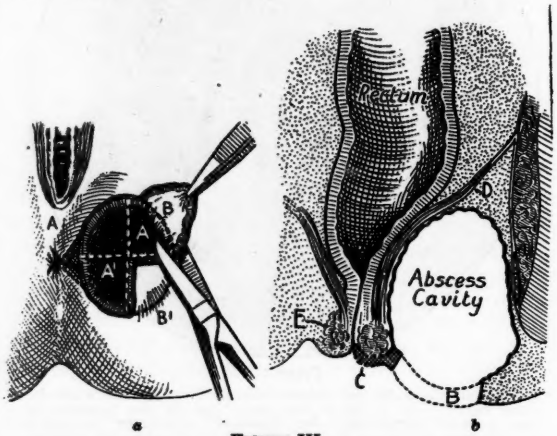

FIGURE III.

Adapted from Victor Pauchet, "Practical Surgery Illustrated." Operative procedures in a case of ischio-rectal abscess as treated at Saint Mark's Hospital. In Figure *a*, *A*, *A'* = lines of original incisions; *B*, *B'* = quadrantic flaps removed as shown; *C* = suggested extra removal of tissues down to the external sphincter to prevent tendency to pocketing in this region. Figure *b*: *B* = surface of abscess removed; *C* = suggested extra removal of tissues, showing their relationship to the external sphincter; *D* = *Levator ani* muscle; *E* = External sphincter muscle.

Preventive Treatment.

As the treatment of these abscesses is so important, if we are to prevent fistulæ forming, a short summary of the operative treatment found satisfactory at Saint Mark's Hospital in these cases will not be amiss at this juncture. The keynote to successful treatment in each case is adequate and sustained drainage from the earliest possible moment after a diagnosis has been made.

Ischio-Rectal Abscess.

As the *levator ani* muscle practically surrounds the rectum behind, there is a space at the back by which the two ischio-rectal fossæ can communicate with one another. This should always be remembered, and a careful search made on both sides for extension of an ischio-rectal abscess, which may also track up through the *levator ani* muscle into the areolar tissue between it and the pelvic peritoneum, and even as far as the iliac fossæ before becoming

very obvious externally. The abscess cavity is also found to be loculated due to the denser bands of connective tissue interlacing in the fat (Figure III). The abscess should be freely incised well to its limits. This may be done by means of a cruciate incision excising the skin in each quadrant, so that the entire skin wall is removed. At first sight this seems to be unnecessary mutilation, but experience has shown that this method, coupled with careful and consistent post-operative treatment is most satisfactory in the prevention of formation of fistulæ. Should the skin wall removed approach at any spot the anal margin, it is found that there is a tendency to pocket in the region of the sphincter in some cases, and this is lessened by excising a V shaped portion of mucosa at the anal margin continuous with the skin wall removed and thereby helping in the after-dressing.

With such an exposure no firm plugging should be used and a flat, moist, antiseptic gauze or strip of wool is laid against the walls to prevent bridging, in order that healing may be by granulation from the depths. Rectal surgery is in the main guided by the principles of "healing by granulation." The finding of a fistula at operation should not tempt one to operate for a radical removal, as a second operation later will find the parts much contracted and more suitable for this procedure. Also no lavage is necessary, but frequent dressings are sufficient.

Subcutaneous Abscess.

Subcutaneous abscesses form just within the anal canal and inside the external sphincter and are thus often very painful. They are usually not very obvious and are usually detected by palpation which shows a tender indurated area with some œdema. They are often of tuberculous origin, though these are comparatively painless, unless associated with tuberculous ulceration. These should be freely opened on the same lines as above, but, if very small, they may be excised and the area allowed to granulate.

Submucous Abscess.

As the name implies, submucous abscesses are found between the mucous membrane and the muscular coat, and are of interest from a diagnostic point of view. The associated symptoms are usually vague, especially if the abscess be chronic, and on palpation they may appear as elastic swellings simulating thrombosed piles or even neoplastic conditions. They may have thick walls and often have a small aperture into the lumen of the bowel, even being present eventually as a long indurated track with branches running laterally. If acute, on digital examination they are extremely tender. They are opened from within the lumen of the bowel, the best exposure probably being obtained by means of a bivalve speculum. The mucosa is incised and then cut away by means of scissors. Hæmorrhage is liable to occur here, especially in high abscesses, but hot irrigations and gauze around the rectal tube are usually sufficient to control this.

Abscesses in the Pelvi-Rectal Space.

Abscesses in the pelvi-rectal space should be approached from outside the rectum, and transverse incision of the fibres of the *levator ani* will give better exposure and drainage than a splitting of the fibres. Tubes tied in and gradually shortened are probably the best means of draining and curing these abscesses. In incising externally a finger in the rectum will act as a guide to the scalpel and prevent damage to the mucosa. One should be content with drainage for the first one to two days, but then gentle irrigation with some weak antiseptic is permissible.

Peri-Rectal Abscess.

Peri-rectal abscess is fortunately rare and may be caused by any inflammation occurring in the pelvis, that is, associated with the appendix, genito-urinary organs, pelvic bones, psoas muscle *et cetera*. The patient may be profoundly toxic, but may only complain of discomfort on defæcation or pain over the sacrum. A streptococcus is generally present. The only satisfactory treatment is free drainage through the ischio-rectal fossæ.

I once operated on a woman who for several days had only noticed perineal discomfort, but who was running a high temperature. The scalpel cut through the tissues of both ischio-rectal fossæ as through cheese and a streptococcus was cultured. After adequate drainage she was eventually operated upon for a complete posterior horse-shoe fistula with success.

TUBERCULOSIS IN RELATION TO FISTULÆ.

A careful investigation involving both histological examination and inoculation of guinea-pigs carried out by Mr. Gabriel, of Saint Mark's Hospital, showed that between 15% and 20% of fistulæ seen there were tuberculous in origin. Microscopical examination of the discharge and scrapings from the fistula were proved to be quite unreliable in arriving at a diagnosis. About 4% of the patients admitted to the Brompton Hospital for Tuberculosis are suffering from fistula, but it does not follow that a tuberculous patient suffers only from tuberculous fistulæ; not infrequently his fistula is non-tuberculous in nature. The mode of infection is probably by the blood stream in most cases, but it may occur directly by infection through a rectal abrasion from tubercle bacilli in the fæces.

Common Causes.

Amongst the commonest causes of fistulæ are old-standing anal fissures in which a small direct fistula forms superficial to the external sphincter, and those following anal and ischio-rectal abscess. Foreign bodies causing fistulæ are not often found and it is possible that they become lodged in already formed fistulæ in some cases. I have seen one fistula the complete track of which was packed with black seed-like bodies, the nature of which was unfortunately never determined.

TYPES OF FISTULÆ.

Fistulæ may be simple, as in those following anal fissures and passing superficial to the external sphincters; or they may have multiple openings, there usually being only one internal opening. More complex forms are the so-called horseshoe fistulæ, either semicomplete or complete in nature, with one internal opening, either anteriorly or posteriorly, and a curved track extending laterally in the ischio-rectal fossa and often complicated by subsidiary tracks.

Time does not permit of a consideration of those interesting and complicated, yet, fortunately, rare fistulæ associated with the urethra, the vagina, pelvic bones, coccyx *et cetera*.

An analysis of one hundred and two patients with *fistula-in-ano* admitted to Saint Mark's Hospital in 1928 is as follows as regards the relative incidence of the different types of fistula:

Simple Direct Fistulæ:
- (*a*) Anterior, 21 (sixteen males, five females). Complications: One submucous track, one hæmorrhoid.
- (*b*) Dorsal, 23 (seventeen males, six females). Complications: Three submucous tracks, three hæmorrhoids, one fissure.
- (*c*) Lateral, five, all male.

Horseshoe Fistulæ:
- (*a*) Anterior.
  - (i) Semihorseshoe, 16 (eight males, eight females). Complications: Two submucous tracks, two hæmorrhoids.
  - (ii) Complete horseshoe, 2 (one male, one female).
- (*b*) Posterior.
  - (i) Semihorseshoe, 22 (thirteen males, nine females). Complications: Two submucous tracks, one pelvi-rectal track.
  - (ii) Complete horseshoe, two (one male, one female). Complications: One tuberculous.

Pelvi-Rectal Fistulæ: Four (two males, two females). Complications: One submucous track.

Ischio-Rectal Fistulæ: Four, all male.

Submucous Fistulæ: Three (one male, two females). Complications: All associated with hæmorrhoids.

Total number of cases: 102.

Of these two showed spontaneous healing, one epitheliomatous changes, one complete epithelialization of the track and twelve were considered to be tuberculous.

Thirty-eight had been subjected to operative treatment prior to admission.

A study of the patients with abscess and fistula treated at the Perth Hospital in the last five years shows that of a total of forty-one patients fifteen had had previous operations. These figures show that 37% of all patients with abscess and fistula admitted to the Perth Hospital have not been cured despite operative intervention prior to their admission.

END RESULTS OF FISTULÆ.

Very occasionally spontaneous healing occurs. Of one hundred and two cases of *fistula-in-ano* in patients admitted to Saint Mark's Hospital in 1928 two were found to have healed spontaneously. Both were dorsal simple fistulæ and occurred in young men of nineteen and twenty-six years of age respectively. One case of complete epithelialization of the track of a dorsal simple fistula also occurred.

Epitheliomatous changes, though rare, may occur in fistulæ of long standing.

However, the commonest course is for fistulæ to continue spreading quietly in the absence of treatment, often eventually arriving at quite considerable dimensions.

SYMPTOMS.

There is usually a history of previous abscess formation in the region of the anus; the abscess has either discharged without operative interference or following incision. The opening has then healed over and eventually the area has shown signs of recurrent abscess formation followed by further discharge of pus, either from an internal opening in the rectum or anal canal or from an external opening or both.

The patient usually complains of a more or less constant discharge which stains his clothing. This discharge varies in quantity and nature and is generally slight and watery when the fistula is established, but purulent and increasing in amount in the presence of fresh irritation. Should it cease suddenly, then probably an abscess will eventuate once more with increase in number and size of the tracks associated.

Bleeding only follows probing or other trauma.

Pain varies considerably. So long as the track of the fistula and the external opening remain patent, there is generally little, if any, pain, but only uneasiness; but should the secretion accumulate from an obstruction to the track, then tension and pain appear and all the symptoms of abscess develop. Blind internal fistulæ with large internal openings usually cause pain at or after defæcation, and traumatic fistulæ with retained foreign bodies may cause considerable pain despite a free discharge. Patients may suffer pain along one or both sciatic nerves and headache is not infrequent.

There may be a passage of flatus and fæces along the track which may or may not distress the patient.

EXAMINATION.

A thorough routine examination of the patient is the only means of arriving at a satisfactory appreciation of the extent and character of the fistula to be operated upon. Many practitioners apparently experience difficulty in examining a rectum and it not infrequently happens that an inefficient examination or no examination at all, as sometimes happens even in these days, has been the means of signing the death warrant of the patient concerned, as, for example, in the appearance of hæmorrhoids complicating carcinoma of the rectum.

A good light is essential and perhaps the best postures are to be found in the "left lateral" for women and the "knee-elbow" for men. It is of assistance to use a simple diagram such as is used at Saint Mark's Hospital (Figure IV), by means of which it is an easy matter to show diagrammatically the tracks and openings of the fistulæ for further reference.

An inspection of the perineum is now made. This is followed by palpation by means of the finger in the rectum, and then by bidigital examination of the parts between the index finger in the rectum and the thumb externally. A probe may be used in conjunction with this palpation. Proctoscopic examination may reveal an internal opening into which a probe may be passed. Sigmoidoscopic examination will show the presence or absence of other concomitant diseases in the rectum and lower part of the pelvic colon. Further information may be obtained by a barium enema; and, especially in pelvi-rectal fistulæ, X ray examinations following the injection of "Lipiodol" may further help in elucidating the problems before us.

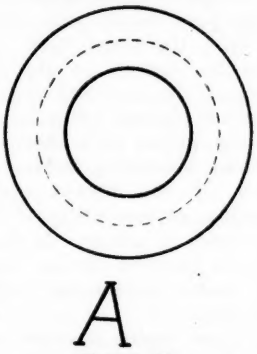

FIGURE IV.
A simple diagram used at St. Mark's Hospital; A = anterior; inner circle = internal sphincter muscle; outer circle = external sphincter muscle; intermediate dotted circle = muco-cutaneous line. A diagrammatic record of all cases is thus easily kept.

Examination should be carried out systematically, due regard being paid to the following four considerations: (i) The external openings, (ii) the internal opening, (iii) the main and associated tracks, (iv) other complicating diseases.

Let us consider these points *seriatim*.

External Openings.

The external opening appears either as the result of operation or by "bursting" of the abscess. These openings may be single or multiple. If multiple, then it is important to try to recognize the primary opening which, generally speaking, is at the distal end of the main track.

Secondary openings may be numerous, as many as forty-two being recorded in one case by Goodsall and Miles. The opening is usually quite small and may appear as a small tuft of granulations, a protruding piece of skin, a slight depression or may be found only with great difficulty by the appearance of pus on pressure with the finger and thumb. The relationship of the external opening to a plane passing transversely through the centre of the anus was found by Goodsall to be in the great majority of cases as follows. Those fistulæ with their external apertures posterior to this plane usually have their internal orifices in the middle line posteriorly, whereas those that are anterior to this plane have their internal openings immediately opposite the external and on the same side. This generalization is now known as Goodsall's rule.

The Internal Opening.

The internal opening is usually single, of varying size and appears as a small pit or slight depression in the mucous membrane, most commonly in the region of the muco-cutaneous line (Hylton's white line) in the mid-line posteriorly, less frequently in the mid-line anteriorly and very uncommonly laterally. Should two openings be discovered on the same level, they would suggest the presence of two separate fistulæ. Digital examination might reveal a small polypus at the site of the internal opening; but a careful search through the proctoscope, with the aid of a fine flexible probe, is of value in showing a defect in the mucous membrane, pus discharge or the presence of granulation tissue. The injection of methylene blue through the external opening may show up the internal opening. A probe pointed director may be gently passed through the external opening into the track and then may pass straight into the bowel. It may be guided by a finger in the bowel on coming up against an obstruction, but no force should be used. Practically always the internal opening is to be found within eighteen millimetres (three-quarters of an inch) of the anal margin.

The Track.

The track of a chronic fistula can be palpated as a firm cord-like thickening under the skin extending from the external to the internal opening of the fistula. It is a firm, hard, fibrous tube lined by soft granulations, the amount and density of fibrous tissue depending on the duration of the fistula. Though the internal opening is usually found between the two sphincters, the commonest arrangement of the track is superficial to the external sphincter and not between it and the internal sphincter. If a director be passed and cut down upon, the appearance is usually one of considerable thickness, but microscopical examination will not reveal muscular tissue at all in many cases, the thickness being due to the inflammatory tissue. The inflammation causing the fistula, tends to spread by the paths of least resistance and is much more likely to spread in the subcutaneous cellular layer than between the two sphincters which are firmly connected together.

The track may be complete or incomplete. If complete, it may be subcutaneous or submuscular. If incomplete, it will be either a blind external or a blind internal track and pus issuing from the rectum should at once suggest a digital examination of the rectum in an endeavour to find the internal opening. The tendency is for a fistula left to itself to grow by means of lateral burrowings and this is a reason in favour of early operation. These offshoots are very important, as they should be completely dealt with in any operative procedure which is to be successful.

Other Complicating Diseases.

Other complicating diseases may be constitutional or local. Of the constitutional conditions probably pulmonary tuberculosis and diabetes are the most important, though the former is not so common as some would think. Locally are to be found hæmorrhoids, fissure, ulceration of the rectum, stricture, polypoid growths and carcinoma. It will be noticed that with the exception of stricture and carcinoma all these conditions occur in the lower five centimetres (two inches) of the rectum. In fact, it is not usually fully realized that most rectal conditions are to be palpated in the lower five centimetres (two inches) of the rectum and that a sensitive and "discerning" terminal two phalanges of the index finger can diagnose practically all rectal conditions.

Spontaneous Healing.

The chances of spontaneous healing are remote and an extension of the process is much more likely. Small, simple, direct fistulæ may heal in the presence of free drainage, but more usually healing is superficial, with discharge internally through a patent opening, leading usually to the formation of fresh tracks in the surrounding tissues. Included amongst the reasons why healing does not occur is an absence of rest, so important in any healing process, and lacking, due to the movements of defæcation, respiration and the suction-like action of the sphincters themselves on the ischio-rectal fossæ, not to mention the presence of irritating secretion and foreign bodies in the tracks themselves. I have seen a case of complete epithelialization of a dorsal direct fistula, though this is a rare occurrence.

Tuberculosis.

Tuberculosis varies considerably and is dependent not only on the character and extent of the lesion, but also to a great extent on the amount of secondary infection present.

Two types may be distinguished. In the first tuberculous ulceration of the bowel with pelvic and genito-urinary tuberculosis and an extension of the inflammatory process into the ischio-rectal fossæ is but an added complication, depending for its gravity on the presence or absence of secondary infection. In the second an otherwise apparently healthy patient without demonstrable lesions of tuberculosis suffers from a slight discomfort, associated with a small mass in the perineum, associated occasionally with lassitude and slight loss of weight. It is noticeable that fever and night sweats are unusual.

A tuberculous fistula shows little or no fibrous reaction around the track and is really a tube of callous and unhealthy granulation tissue which is often more extensive than would appear, with associated extra tracks. There is a thinning and undermining of its edges at the external orifice, with the surrounding skin bluish and unhealthy in appearance. The insidious development of an inflammatory mass in the peri-rectal tissue in an otherwise healthy individual is always suspicious. In the presence of ulcerative proctitis or other tuberculous lesions the peri-rectal mass is probably secondary to them, but should further examination fail to elicit evidence of such involvement, then the presumption of primary ischio-rectal tuberculosis is warranted.

DIAGNOSIS.

In examining a fistula one should discover whether one is dealing with an otherwise normal rectum or whether hæmorrhoids, ulceration, stricture or malignant disease are present. Thus, routine sigmoidoscopy is really essential in all cases. Should a careful examination reveal no suspicious internal opening and a probe introduced through the external opening pass deeply into the ischio-rectal fossæ or away from the bowel itself, one must consider other possible sources of abscess formation. Amongst these may be included prostatic abscess, diverticulitis, pelvic abscess following salpingitis or appendicitis, suppuration in a Bartholinian gland or Cowper's gland, spreading inflammation following perforation of the uterus and vagina in attempted abortion, osteomyelitis of the spine and other adjacent bones *et cetera*. If these and other conditions can be proved to be non-existent, a further search under anæsthesia may still reveal an internal opening.

I regret that I am unable to show tonight several X ray photographs taken for Mr. Norbury, Surgeon to the In-patients, Saint Mark's Hospital, showing "Lipiodol" injections along the fistulous tracks of conditions such as I have mentioned this evening. Though he has very kindly permitted me to make whatever use I wish of these films, they have unfortunately not arrived from England in time for demonstration tonight. By a very simple technique "Lipiodol" was injected into fistulæ which passed deeply into the ischio-rectal tissues, and the most interesting results were obtained. Tracks were found extending in some cases as far as the iliac fossæ where considerable cavities were outlined and much of value was ascertained in diagnosis by a study of the tracks of the obscure fistulæ thus examined. I consider that, properly used, this method is of great value in arriving at the diagnosis of fistulæ in this area, as elsewhere.

Speaking generally, from a diagnostic point of view, probing is unnecessary. The external opening is visible, the track from it is easily palpable and the internal opening which exists in most cases can be detected by digital palpation in the bowel wall. Instrumentation is repugnant to most patients and should be used as sparingly as possible. The first inch of the index finger, carefully trained, is the best instrument as yet devised.

TREATMENT.

Treatment may be either palliative or operative.

Palliative Treatment.

Generally speaking, palliative treatment brings about a state of quiescence but does not cure and

thus should not be employed except in the presence of contraindications due to constitutional causes. However, in the presence of much pain, discharge and extension of the burrowing, some operative interference is imperative. Naturally constitutional treatment is of great importance, whilst locally warm sitz baths (ten to fifteen minutes twice a day), foments and proper regulation of the bowels, with the avoidance of fluid stools are of value. Occasionally the old method of injecting silver nitrate (2·0 grammes to 100 cubic centimetres or ten grains to the ounce) along the track may bring about healing, though at the outset it leads to increased pain and discharge; and even sloughing has followed. Whilst Assistant Resident Medical Officer at the Wooroloo Sanatorium, Western Australia, I injected quite a number of fistulæ with Calot's paste and my experience was that no cures resulted, though, following a short period of increased secretion, the fistulæ became practically dry and this led to increased comfort.

Operative Treatment.

The keynote to success in all operations on these parts is "drainage." Provided adequate and sustained drainage is present, then the wound will heal. To insure success it must be remembered that mucous membranes heal much more slowly than cutaneous surfaces and it should be considered a principle never to allow the cutaneous surfaces to heal before the mucous surfaces in the same wound. The question of successful healing, therefore, does not depend on the division of the sphincter, as so many believe, but on the provision of drainage which must be adequate for all parts of the wound, both superficial and deep, until completely healed. It is always wise to warn the patient that some slight interference with the wound may be necessary in the after-treatment, should drainage become at all unsatisfactory, and he will not then be unduly alarmed should this occur.

The operative procedures used are as follows: (i) Excision of fistula leaving the wound open, (ii) incision of fistula leaving the wound open, (iii) excision of fistula followed by suturing of the wound, (iv) a combination of (i) and (ii) especially with (iii) added in certain rare circumstances, (v) the use of the elastic or silk ligature (of historical interest only).

Though excision of the fistula leaving the wound open is undoubtedly the best method, yet in the larger fistulæ a compromise is usual, parts being excised and others incised. Excision must not be carried out if much valuable tissue is to be sacrificed and it is very important not to damage the sphincters—not a difficult thing to do! Also the operator should bear in mind the fact that considerable scar tissue may follow his operation and he must diminish this to a safe minimum.

As for primary suture, this is impossible in the large complicated fistulæ where it is most wanted; and at all times it should only be attempted with a certain diffidence, the operator being ready to remove the stitches at the least sign of sepsis, thus converting the after-treatment into that for "excision with an open wound," with the added possible complication of stitch abscesses.

Preparation of Patient.

The following routine in the preparation of the patient is one used at Saint Mark's Hospital and has been found most satisfactory. Following this method it is most exceptional to have to wash out the rectum on the operating table due to contamination by descending fæces.

A two days' preparation is used. Let us consider that the operation is to occur at 2 p.m. on a Monday afternoon. Then on Saturday night thirty cubic centimetres (one fluid ounce) of castor oil are given. Early on Sunday morning a dose of *mistura alba* is given. On Sunday night a soap and water enema is given and thirty cubic centimetres (one ounce) of the following prescription:

Tincture of opium, 0·6 mil (10 minims).
Solution of acetate of ammonia, 1·8 mil (30 minims).
Spirits of chloroform, 0·9 mil (15 minims).
Tincture of catechu, 2·0 mil (half a fluid drachm).
Compound tincture of cardamons, 4·0 mil (one fluid drachm).
Cinnamon water to 30 cubic centimetres (one fluid ounce).

A hot bath is taken and the parts are shaved.

Early on Monday morning a plain water enema is given and repeated if the return be not clean, and another 30 cubic centimetres of the above prescription are given. At 11 a.m. a cup of "Bovril" is given and a tablet of "Opiodine" ("Omnopon") (0·01 gramme or one-sixth of a grain) is given. The parts are now painted with 2% tincture of iodine.

The diet is as follows: On Saturday ordinary diet; on Sunday light diet is given: for breakfast, ordinary food with no eggs; for luncheon, "Bovril" and milk pudding; for tea, bread and butter; at 6 p.m., milk. On Monday breakfast consists of bread and butter and tea. At 11 a.m. a cup of "Bovril" is given.

If a sigmoidoscopic examination has not previously been made, this should be done during the morning when the bowel will be clear. Three-quarters of an hour before operation a hypodermic injection is given: 0·015 gramme (one-quarter of a grain) of morphine and 0·54 milligramme (one one-hundred-and-twentieth of a grain) of atropine to a man; the morphine in a dose of 0·01 gramme (one-sixth of a grain) to a woman. The above preparation should prevent fæcal contamination of the wound until the process of granulation has commenced. One should not operate for fistula in the presence of acute inflammation, as the field of operation can be much reduced by preliminary incision and drainage, assisted by irrigations, foments and baths.

Position of Patient.

The lithotomy position gives the best exposure and it is advisable to swing the buttocks well forward and to tilt the table back a little if necessary.

A good spot light should be above and behind the operator for a maximum of light. The semiprone position is sometimes used, however, when the fistula should be on the lower side.

A further cleansing is now carried out on the table. First, ether soap and water on cotton wool swabs and then lysol or "Monsol" (seven cubic centimetres to a litre or one drachm to the pint) is used to clean the lower part of the rectum and perineum, whilst biniodide of mercury (one in five hundred parts in 75% alcohol) completes the perineal toilet.

Anæsthesia.

Though general anæsthesia is generally used, sacral, spinal or local anæsthesia may be used with success.

Instruments.

Probe-pointed straight and curved steel directors, flexible silver probes, strong scissors, straight and curved on the flat, straight steel grooved director, Lane's tissue forceps, bivalve proctoscope, scalpels, Spencer Wells forceps *et cetera* are used.

The Operation.

Simple Fistulæ.

Simple fistulæ are usually straight but should be examined carefully for pockets and other complications. A curved steel director with a fairly thick point should be carefully passed from the external to the internal opening, through which it is passed and brought out of the anus. Unless gently done or unless a fine pointed probe is used, it is very easy to miss the track and make false passages. Instead of passing a bistoury along the groove it is very satisfactory to cut down with a scalpel on to the director. This permits one to see any muscular fibres of the sphincter that may be cut through. The best retractors are Lane's tissue forceps which are held by the assistant. The granulations are now curetted or excised and a careful search made for any side tracks. These are seen as small dark apertures lined by granulation tissue and they should be traced up and removed. If much dense fibrous tissue is present and it is not considered advisable to remove it, then by cutting through it in different directions in a criss-cross manner (Salmon's back cut) the effect of its presence is much lessened. The wound edges are now freely removed, leaving a gutter-like appearance and no overhanging ridges. Finally, all bleeding points should be stopped either by torsion, hot saline solution pads or else by the application of artery forceps. The ligatures should be of tubular (braided) silk which is tied as tightly as possible, and the ends are left long so that they will not become buried in granulations. Plugging will suffice for a general oozing, but deep hæmorrhage may need the passage of a large drainage tube surrounded with vaseline gauze inserted into the rectum.

Complicated Fistulæ.

Complicated fistulæ should be laid open externally at once and the internal opening (there is usually only one) last. Having carefully incised or excised all tracks and external openings and having cut away all promontories and bridges which might interfere with healing, one is able to examine and demonstrate the internal opening. The external sphincter should never be divided more than once and on no account should it be divided in any but a radial direction. An oblique cut across the external sphincter spells bad surgery and leads to loss of control and to a badly shaped scar. As most cases of rectal incontinence follow operations for lateral fistulæ in which the external sphincter is cut, it should be made an inviolable rule that lateral fistulæ with tracks deep to the external sphincter should be divided in a two-stage operation, the second operation following ten to fourteen days later. Some surgeons, however, divide the sphincter at this stage and excise the fibrous track, immediately suturing the ends of the muscle with deep traction sutures of silkworm gut. The second stage operation is thus usually a small one, entailing usually only the division of the sphincter.

Horseshoe Fistulæ.

As in the previous type, of which it is really an example, the external tracks of horseshoe fistulæ should be well laid open by means of a curved bistoury along the groove of a director previously passed through one of the external openings. This director should not be made to turn corners, but should be cut down on carefully and systematically, great care being taken that the sphincter does not become involved. Once more the internal opening is demonstrated, either in the mid-line dorsally or anteriorly, depending on the type, and this should be cut at a second stage operation. Alternatively, should difficulty arise, a director may be passed back through the internal opening which is demonstrated by means of a bivalve proctoscope, or following eversion of the anal margin with Lane's forceps. The point is then cut down on posteriorly, the sphincter still being left for the second stage, but the tracks being traced from the central opening. The two-stage operation, due to the fixation and support by the new tissue forming in a healing wound, avoids a certain amount of deformity of the anus arising from the loss of skin supports with retraction, which also includes the ends of the external sphincter and may lead to incontinence. Should any tracks pass upwards deeply as blind pockets, they should be dilated with artery forceps and a tube tied in which is later gradually shortened.

Fistulæ in Wall of Rectum.

There are two types of fistulæ in the wall of the rectum: (i) Those passing in the submucous layer and (ii) those passing deep to the muscular layer. Careful exploration with a probe and a bivalve speculum is essential and these tracks may be found complicating fistulæ of any type, being either single or multiple. If considered too extensive or passing deep to the muscular layer, then the track may be dilated by means of an artery forceps and a rubber tube passed to its end and sutured in. This tube is

then slowly shortened and irrigation may be carried on through it. If a tube will not stay in, wick gauze may be used, but is not as satisfactory. Submucous tracks should be opened into the lumen of the bowel, the edges being trimmed away; but there is always the danger of severe hæmorrhage following this procedure which necessitates tamponade with cotton wool around a large tube for forty-eight hours.

Fistulæ with Lateral Internal Openings.

Fistulæ with lateral internal openings are fortunately rare and require very careful treatment. It is in these cases in which the external sphincter can be seen as a band crossing the wound when the external tracks have been widely opened and the internal opening demonstrated. Never divide the sphincter unless absolutely essential for drainage and never divide it except at the second stage when the muscle is held firmly by scar tissue. One must here reiterate that the sphincter must be cut at right angles.

Fistulæ with Internal Openings above the Internal Sphincter.

As already stated, the internal sphincter plays but a small part in the control of the anus and the important muscle is the external sphincter. Wide exposure of the tracks externally with demonstration of the internal opening is essential and at a second stage the tissues may be cut down to the internal opening without fear. Very careful after-treatment may obviate the necessity of making this division, as occasionally the internal opening may heal when supplied with adequate drainage.

Fistulæ with Two Internal Openings.

If fistulæ with two vertical openings are in the same vertical plane, they may be opened together; but if not, they should be treated as separate fistulæ and opened separately.

Blind Internal Fistulæ.

After demonstration of the internal openings blind internal fistulæ should be converted into complete fistulæ by the passage of a probe which is cut down upon externally whereupon the treatment is as outlined above.

Blind External Fistulæ.

When it is proved that there is not internal opening, adequate exposure below of blind external fistulæ is all that is necessary.

Primary Suture.

Success in primary suture depends on the complete removal of the diseased tissue, good apposition and thorough asepsis, both during and after operation with the absence of too much tension. Its only application is probably in lateral fistulæ and in the closure of outlying and extensive tracks of large complicated fistulæ, both of which conditions have been already mentioned. It is important not to use absorbent sutures as infection is thereby carried into the depths of the wound.

Complete Excision.

Complete excision of a fistula is occasionally possible after passing a probe, when the tube of fibrous tissue can sometimes be completely removed.

Tuberculous Fistulæ.

In the presence of active pulmonary tuberculosis when the patient is suffering from little discomfort the fistula should await an improvement in the general condition, provided always that there is free drainage; but where there is ulceration with much pain, discomfort and discharge, free drainage should be obtained with a minimum of interference. The chances of recovery are then improved. Spinal or local anæsthesia is always satisfactory in these cases and either diathermy or the cautery should be applied to avoid metastatic dissemination following operation. Needless to say, a sanatorium life is highly desirable in these cases.

One of the disadvantages of all present operations is the large amount of hard scar tissue which appears in the process of healing. In marked contrast to this is the soft appearance of the scar following the application of the diathermic current to a tuberculous ulcer or fistulous area in the region of the anus; and in another branch of surgery, following the tannic acid treatment of burns. The irritation caused to so large a granulating area in such a position, however skilful the after-treatment, is perforce considerable; and though I have not as yet heard of the light application of the diathermic current to this raw area after operations for fistula to facilitate healing by thus protecting the deeper tissues, I feel sure that not only would the scar be much more satisfactory, but the period of convalescence probably reduced and I propose to test this view when possible.

Complications After Operation.

Hæmorrhage.

Hæmorrhage may be primary, reactionary or secondary and it is usually impossible to apply a ligature. A large tube in the rectum with gauze packing usually controls, but in high lying fistulæ long forceps may be necessary and should be left on at least twenty-four hours.

Retention of Urine.

These patients are singularly free from retention of urine and it is probably brought on by tight plugging.

Incontinence.

Incontinence is commonly present in small extent during the early stage of healing, but usually soon disappears. If it persists, then a plastic repair of the anus must be performed. It is a most distressing and preventible complication. The possibility of attendant nervous disorders must not be forgotten before proceeding further.

With the patient in the lithotomy position one can map out the extent of the sphincter as apart from the scar tissue present. If the circumference be lightly touched with the finger a contraction

occurs at the site of any muscle present and thus simply, valuable information can be obtained.

After-Treatment.

Success in after-treatment depends on the personal supervision and proper understanding of the treatment by the surgeon concerned. Frequent changes of dressing are necessary in the earlier stages to keep the wound clean and free of discharge. Foments should be frequently repeated over the light pack in the wound for the first two to three days and this should be left until soiled by the first passage of fæces. On the third evening liquid paraffin (30 cubic centimetres or one ounce) is given and the rectal tube, if any, is removed after olive oil (60 to 90 cubic centimetres or two to three ounces) has been injected through it. Next morning *oleum ricini* (30 cubic centimetres or one ounce) is given. If no hæmorrhage follows defæcation, an antiseptic bath may be given that evening and the wound irrigated with eusol and dressed lightly with eusol gauze. The irrigation and dressing should be performed twice a day and a bath given once. After this liquid paraffin (30 cubic centimetres or one ounce) is given twice a day, associated, if necessary, with *"Cascara evacuans."*

The dressings are now changed to thin sheets of cotton wool soaked in mercury perchloride (one in one thousand). The wool comes away in the bath and should also be replaced whenever soiled. Using a Saint Mark's probe flat strips of wool are gently pushed up to the apex of the wound and so into the lumen of the bowel. In certain deep tracks a finger of the left hand in the bowel may assist in the accurate placing of the wool in deep tracks. Light packing only is essential.

A careful and frequent inspection should be made of the wound to prevent any bridging of adjacent surfaces, as it is essential that healing should occur from the depths. The gloved finger smeared with vaseline is most satisfactory in exploring a wound and breaking down these bridges, whilst a probe and scissors both have their value.

Healthy granulations soon form and these and the growing epithelium should not be damaged by antiseptics. Wool soaked in vaseline or olive oil is bland and unirritating, but should stimulation be necessary, one may choose from *lotio rubra*, brilliant green, scarlet red, Friar's balsam and many other drugs. Ultra-violet rays are here of great help when applied to a granulating area which is stationary. It should be remembered that over-stimulation is harmful. The patient should be kept in bed until healing is complete and for an extra week, if possible, giving time for the organization of the scar before walking occurs. It is important also to insure soft stools to minimize trauma.

Causes of Delay and Non-Healing.

Delay and non-healing are in the first place due to an inadequate operation, the commonest causes being the missing of a track or of the internal opening or of not allowing for sufficient drainage. These of necessity must be operated on again for relief.

Secondly, errors in postoperative treatment, such as too tight plugging or the allowing of bridges of granulation tissue to develop, are to be rectified in the ensuing dressings.

Lastly, the constitutional condition of the patient may militate against quick recovery. Tuberculosis, diabetes, alcoholism *et cetera* must also be treated to ensure the relief for which one hopes.

Acknowledgements.

In conclusion I wish to acknowledge gratefully the kindness of Dr. T. L. Anderson, Chief Resident Medical Officer of the Perth Hospital, in so readily giving me access to the hospital records; Dr. T. B. Seed for the loan of microscopical specimens and for much helpful criticism; and also Dr. B. C. Cohen and Dr. Younkman for help in preparing specimens and in working the epidiascope.

I cannot let this opportunity pass without acknowledging my very great indebtedness to the entire staff of Saint Mark's Hospital, London, Mr. Lockhart-Mummery, Sir Charles Gordon-Watson and Mr. Norbury, Surgeons to the In-Patients, and Mr. Gabriel and Mr. E. T. C. Milligan, Surgeons to the Out-Patients, and Dr. Cuthbert Dukes, Director of Clinical and Pathological Research. Throughout my residence at Saint Mark's Hospital these gentlemen were most considerate and helpful in imparting whatever was possible from their vast experiences in this work and I have much pleasure in stating that but for their many kindnesses this paper would not have reached fruition this evening.

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Reports of Cases.

AN UNUSUAL CASE OF PULMONARY ŒDEMA.

By O. WESTCOTT FREWIN, M.B., B.S.,
Hindmarsh, South Australia.

THE following report is of interest by reason of the unusual cause of the case.

At about 5 p.m. on March 16, 1930, the patient, a robust, high-spirited young woman, aged twenty-two years, jumped into the water from a pleasure launch anchored at the lower end of the Port River. It was a very bleak windy day, so the water was very cold and it was her first plunge for the day.

Regaining the surface, she turned and waved to the occupants of the launch and then swam a double overarm stroke for fifty to sixty yards, when she called out as if in distress and after swimming another dozen yards she turned on her back and progressed twenty to thirty yards before she was rescued and brought back to the launch in a dinghy. A high myope and swimming without her glasses, she was probably unable to see the launch from the distance and so had lost her sense of direction to some extent. At no time since she first started swimming was she submerged.

When rescued, she was apparently unconscious and bright blood, a little frothy, was issuing freely from her mouth. About ten minutes later she was attended on the launch by a medical man who was a member of the party. She was then unconscious, deeply cyanosed; the mouth was filled with bright blood and blood clot. She was turned on the side, the mouth and pharynx mopped out and artificial respiration commenced by gently compressing the thorax. It was noticed that with any attempt to assist respiration, bright blood issued from the mouth. She had incontinence of fæces.

After a few minutes natural respiration became established and consciousness was regained. She coughed occasionally during the next hour, each time bringing up bright blood and a little froth. She was mentally quite clear and spoke freely; so freely that she had to be restrained. Apart from feeling very weak she was in no distress, but the cyanosis did not clear.

She was packed up with hot bottles and blankets and given two doses of about two drachms of brandy in two or three ounces of hot water.

She had never suffered any serious illness, but two or three years before it had been noticed that she would have to leave off playing basket ball and lie down on account of shortness of breath. She was known to have taken thyreoid tablets for weight reducing.

At 6.45 p.m. I was called to see the patient. It was then bitterly cold and the launch was at anchor at Birkenhead, about thirty yards from the landing. The patient was lying on an improvised bunk in a restless, semiconscious condition. The skin was cyanosed, the respirations forty per minute, shallow, regular and audibly crepitant, the pulse 160, thin and regular, and the temperature 35·5° C. (97° F.). Any movement caused coughing, which each time produced a little bloodstained froth. Numerous fine moist râles were heard throughout the lungs. There was possibly some increase of the right cardiac dulness, but this was difficult to confirm; the apex beat was not displaced and no bruits were heard; 0·01 gramme (one-sixth of a grain) of morphine and 0·0012 gramme (one-fiftieth of a grain) of atropine were given hypodermically and the patient moved to "Wolverton" Private Hospital. As she had to be conveyed on a stretcher in a dinghy to the shore and then lifted into a car, the moving entailed much disturbance of the patient, and when she was eventually put to bed it was after 8 p.m. and her condition was much worse. The pulse was very weak, rate 200, the respirations 48 and more moist than before, the patient quite comatose and very restless. The skin was livid and cyanosed and the extremities cold. An intramuscular injection of 0·18 gramme (three grains) of camphor in oil was given followed by 0·0012 gramme (one-fiftieth of a grain) of atropine and 0·015 gramme (one-quarter of a grain) of morphine. Shortly afterwards one cubic centimetre of "Pituitrin" was injected into the cardiac muscle and 240 cubic centimetres (eight ounces) of blood were withdrawn by venupuncture. Dr. de Crespigny saw the patient in consultation and inhalation of amyl nitrite was tried without any sign of improvement. The lung signs remained unchanged. Oxygen was obtained at about 9.30 p.m., by which time a further 0·6 milligramme (one-hundredth of a grain) of atropine had been given and the condition had improved somewhat. Following the administration of oxygen the cyanosis cleared, restlessness became less and the patient gradually regained consciousness and was able to say a few words to her people. She then went to sleep and dozed throughout the night, appearing quite comfortable at midnight, although the respirations were still faintly crepitant and râles were present throughout the lungs. At 4 a.m. the nurse made a mental note that "at any rate she is no worse." At 6 a.m. she suddenly collapsed and died without any warning.

An autopsy was not performed.

Reviews.

TREATMENT FOR THE GENERAL PRACTITIONER.

DR. BECKMAN'S idea of general practice as represented in his book on treatment is a very wide one, for the work ranges from the acute infections through diseases of the various systems, including the skin, to poisoning, drug addiction and obstetrics.[1]

Certain sections are of necessity very incomplete and some of the rarer diseases, especially among the infections, might have been omitted without great loss.

The obstetric section does not materially add to the value of the book, except in the parts dealing with anæsthesia and the toxæmias.

The author's method is that of the compiler and many of the descriptions of special methods given are lifted entirely from articles and monographs written by recognized authorities. This scheme tends to make the book less compact, but the extensive quotations from such writers as Joslin on diabetes, Alvarez on dyspepsia and Eggleston on digitalis therapy add considerably to the authority and value of the work.

A number of special techniques are described in detail, such as injection of hæmorrhoids and varicose veins, intravenous administration of glucose and of mercurochrome and the antiseptic dyes and the tannic acid treatment of burns.

Syphilis is given considerable space and the need of very thorough treatment is insisted upon, as well as a rigid standard of cure. No practitioner taking this account for his guide could possibly be content with a perfunctory method. Gonorrhœal infections in both sexes are also dealt with in considerable detail.

The section on poliomyelitis gives an adequate account of the use of convalescents' serum and also of Rosenow's serum, though a more forcible and detailed statement of the important early diagnostic methods would be welcome, as the whole success of treatment depends upon them.

It is interesting to compare the conventional serum dosage recommended in the section on tetanus with that adopted in Dr. Paterson's remarkable Brisbane series recently published, in which a total of one million units was several times exceeded.

The doses of antitoxin suggested in diphtheria have the undoubted authority of the New York Health Department behind them, but probably these too are not infrequently exceeded by Australian physicians.

The section on tuberculosis includes tuberculin and "Sanocrysin" therapy, but it seems a pity that the scheme of the book has relegated artificial pneumothorax to references in the bibliography in company with the major surgical procedures. In some such respects the work is rather uneven. Thus the X ray therapy of whooping cough is given four pages; the treatment of diphtheria carriers by kaolin is fully described, but of tonsillectomy for carriers it is remarked that "this is said to be effective."

Bronchiectasis is described as being "secondary to tuberculosis, pneumoconiosis, tumour of the lung, etc." and dismissed in a few sentences.

In other places forms of treatment of doubtful efficacy are given good space. Thus practically as much is said about nitrohydrochloric acid in hay fever as about ephedrine. Some of this unevenness is perhaps unavoidable where less usual subjects are dealt with. The reader who desires information concerning the use of phenylhydrazine in erythræmia, or orthoiodoxy-benzoic acid in

[1] "Treatment in General Practice," by Harry Beckman, M.D., 1930. Philadelphia and London: W. B. Saunders Company; Melbourne: James Little. Royal 8vo., pp. 899. Price: 50s. net.

arthritis, for instance, will find the detail he requires in Dr. Beckman's book. Even statistical detail, as in the results of the quinidine treatment of auricular fibrillation, will be found in several sections.

Some controversial topics are handled tactfully by the presentation of opposing points of view. Thus in the discussion of gastric ulcer the questions of feeding in the presence of bleeding and of blood transfusion are presented in their sponsors' own words and the reader is allowed to make his own choice.

The section on nephritis is perhaps less successful than some of the others. Renal function might with advantage take a more important place in the selection of the correct therapeutic course. On page 496 some of the symptoms of uræmia "due to renal insufficiency primarily" are regarded by most clinicians as due to the coincident vascular disturbances.

Liver treatment in pernicious anæmia is fully described, though there is no mention of the use of desiccated hog stomach.

But notwithstanding these criticisms the author has collected a mass of useful and detailed information, and while his material is not always sifted through the sieve of personal judgement and trial, much of it is taken from sources of unquestioned authority. The style is clear and readable, despite occasional neologisms such as "internologic" and "neurorecurrences." The format of the book is excellent; there is an extensive bibliography, largely American, and a full index.

Anyone consulting this work will certainly find a wealth of therapeutic suggestions, sufficient detail as to method and on the whole adequate counsel as regards the relative merit of various forms of treatment.

GRAY'S ANATOMY.

AMONG the many works on systematic human anatomy available to students, none stands higher in the general estimation of the English-speaking profession than "Gray's Anatomy." It embodies the teachings of the English school of anatomy in general and the London school in particular. Its popularity is shown by the fact that since the first edition was published in 1858, it has run into twenty-four editions. The last of these published in 1930 is just to hand.[1] Five editors, commencing with Henry Gray, have had the moulding of the work. The last and twenty-fourth edition is edited by T. B. Johnston, Professor of Anatomy in Guy's Hospital Medical School, the University of London. Professor Johnston has left the work in general in the same form as his predecessors, but has rewritten the description of the nervous system. He has embodied the researches of Professor Grafton Elliott Smith in his description. The section on embryology has been brought up to date. We regret, however, to see that the sections on applied anatomy have been curtailed, as requirements of the student and practitioner are essentially those of anatomy applied to the living patient rather than the academic study of the cadaver.

It is gratifying to see that in the latest edition the work of several Australian investigators has received recognition. Reference is made in the text to the work of T. K. Potts on the "Grey Rami to the Lower Cervical Nerve," to the work of Hunter and Royle on the "Sympathetic Nervous System and Muscular Tonus," to that of G. H. S. Lightoller on "The Muscles of the Face," to B. Coen and his investigations on the "Relations of the Meningeal Sinuses to the Cranial Bone," to H. H. Woollard on the "Innervation of the Heart," Professor D. A. Welsh on the "Parathyroid Glands" and Professor Grafton Elliott Smith on the "Nervous System."

The printing and illustrations are as usual up to the high standard which has been maintained in the previous editions. Over one hundred new illustrations appear in the text. The index has been arranged on a different plan in the twenty-fourth edition. It covers 67 pages and is liberally cross indexed. It should be of considerable assistance to anyone desiring to look up references in the work.

[1] "Anatomy, Descriptive and Applied," by Henry Gray, F.R.S., F.R.C.S.; Twenty-fourth Edition; Edited by T. B. Johnston, M.B., Ch.B.; 1930. London: Longmans, Green and Company Limited. Royal 8vo., pp. 1482, with 1301 illustrations, of which 607 are coloured.

THE REGULATION OF THE CIRCULATION OF THE BLOOD.

THERE is a great number of recently published investigations on the important problem of the regulation of the circulation of the blood. Mostly highly technical in character, these contributions are scattered in dozens of journals of the different specialities of medical science. Undoubtedly, even for the worker in the field, it is difficult to know and to correlate all the experimental findings.

W. R. Hess, Professor of Physiology at the University of Zurich, himself a noted investigator on the circulation, made it his task to group and correlate critically the modern researches bearing on its problems, considering the literature up to the middle of 1929.

The regulative control of the capillaries, arteries, veins, spleen and heart are discussed in special chapters. As the capillaries and heart have been considered recently by special monographs, the author enlarges somewhat on the arterial venous system which so far had not found sufficient consideration. Each chapter is commenced by a concise account of the hæmodynamic conditions in the organs under consideration. Next the experimental methods are discussed, possibly somewhat too briefly, and the results are critically reviewed.

Finally the cooperation of the circulatory organs with regard to nervous control is demonstrated. This phase of the physiology of the vegetative system receives an exceptionally clear description. The new conception of the "discharge reflex" of the carotid sinus area is well brought out, and also mentioned is the recent important observation by Koch and Mies that after blocking the afferent depressor and carotid sinus nerves permanent hypertension with subsequent left cardiac hypertrophy is established.

This book is mainly of importance to the physiologist or other worker in this particular field. In a concise and readable form about seven hundred references are brought into correlation. Although it contains no clinical application, it gives a clear and brief account of the present situation and may be of value to the practitioner from this point of view.

Notes on Books, Current Journals and New Appliances.

HENRY HILL HICKMAN.

THE first experimental investigator to show that pain during surgical operations could be abolished by the inhalation of a gas was Henry Hill Hickman. He was born near Bromfield, a few miles west of Ludlow, England, on January 27, 1800; he died in 1830. The centenary of his death was the occasion of an address by Lord Dawson of Penn at a reception of members of the Section of Anæsthetics of the Royal Society of Medicine at the Wellcome Historical Medical Museum on April 2, 1930. A book, commemorative of the occasion, has been published.[2] It contains the documents in relation to his work. It is pointed out that his work was not appreciated by his contemporaries either in England or in Paris. The account of his experiments on animals in which animation had been suspended by the administration of carbon dioxide, is most interesting. The book will appeal to all who are interested in medical history, particularly that relating to anæsthesia.

[1] "Die Regulierung des Blutkreislaufes, Gleichzeitig ein Beitrag zur Physiologie des Vegetativen Nervensystemes," by W. R. Hess; 1930. Leipzig: Georg Thieme. Crown 4to., pp. 162, with 21 illustrations. Price: Marks 12 net.

[2] "Souvenir: Henry Hill Hickman Centenary Exhibition, 1830-1930," at the Wellcome Historical Medical Museum. Crown 4to., pp. 85.

The Medical Journal of Australia

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract from a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction, are invited to seek the advice of the Editor.

ACTINOMYCOSIS AND MILK.

THE term actinomycosis is used in medicine, human and veterinary, to include conditions due to many organisms. In text books of the previous generation it was stated that actinomycosis was a disease of cattle, due to infection by a streptothrix, the ray fungus, actinomyces, and that the disease in man was very similar to that seen in animals and that it might be caused by a number of organisms belonging to the streptothrix group. During recent years much work has been done and many organisms are recognized as being capable of producing the so-called sulphur granules found in the pus from actinomycotic lesions. Finality has not been reached in the classification of these organisms. On microscopical examination the granules are seen to consist of a central collection of microorganisms and a radiating fringe of club-shaped bodies. It was this "club" formation that was largely instrumental in fostering the idea that the infection was always due to a streptothrix. The discovery by Lignières and Spitz in 1902 of a Gram-negative bacillus, the actinobacillus, was really the turning point in the unravelling of the mystery. This work was practically neglected until 1916, when Griffith confirmed the findings; since then many observers have confirmed and extended the work. It is unnecessary to describe in detail the many organisms that may produce the granulomatous change known clinically as actinomycosis Their variety will best be indicated by drawing attention to a classification given by L. Colebrook at a meeting of the Royal Society of Medicine. He described two main groups: Infections associated with granules bearing clubs and infections by mycelial organisms, but accompanied either by no granules or by granules not bearing clubs. The causative organisms of the former group he enumerated as *Actinomyces bovis* of the anaerobic type, mycelial organisms distinct from *Actinomyces bovis*, the actinobacillus of Lignières and Spitz, the staphylococcus and *Bacillus pyogenes*.

Of the organisms enumerated, staphylococci hold a particular interest on account of their liability to affect the udders of pigs and cows. It has recently been shown in an important study by Harold E. Albiston, of the Veterinary Research Institute of the University of Melbourne, published in *The Australian Veterinary Journal*, March, 1930, that what is best described as clinical actinomycosis, occurs in cows in Victoria to such an extent that it should be seriously considered from the public health aspect. The discovery of the prevalence of this disease in cows followed the introduction of *The Milk and Dairy Supervision Act* of 1906. Albiston's study is mainly concerned with the pathology of the condition in the cow's udder; reference will be made to this at a later date. In discussing the relationship of the condition to the public health he states: "The demonstration that mammary actinomycosis in the great majority of cases is of staphylococcic origin tends to minimize the importance of the disease in its relation to the public health." And again: "While from an æsthetic point of view it may be considered that the use, for human consumption, of milk derived from cows showing any pathological conditions of the udder should be prohibited, it is very debatable on economic grounds whether the animals showing a few staphylococcic nodules in an otherwise apparently normal udder, should be treated as suffering from a disease communicable to man and slaughtered." He adds that during the three years ended June 30, 1929, 1,517 cows were destroyed in Victoria as a result of a clinical diagnosis of mammary actinomycosis.

Although the economic aspect of this question is undoubtedly of importance, particularly at the present time, the health of the people must be paramount. The pathological process either does or does not ulcerate into the mammary ducts. Schlegel has stated that this ulceration is possible. Albiston in his twenty-six cases found no ulceration and in the examination of "a small number of samples" from cows with clinical signs of mammary actinomycosis found no indication of infective material from the nodules. Albiston's series is obviously too small to justify definite conclusions. His work should be extended and herein lies an opportunity for collaboration between veterinary pathologists and those of the public health departments. In the meantime there must be no relaxation of public health precautions under the acts dealing with dairy supervision. Only when observers like Schlegel are shown to be wrong, does the question become debatable. Æstheticism need not be considered.

Current Comment.

SPASM OF CEREBRAL VESSELS.

TOWARDS the close of last century Leonard Hill described a brilliant series of experiments, the results of which dominate still our knowledge of the physiology and pathology of the cerebral circulation. The absence of demonstrable sympathetic nerve fibres in the vessels of the brain led him to the conclusion that this organ has no direct vasomotor mechanism. Physiologists appear to have accepted this teaching, not only on experimental, but also on philosophical grounds. For it would seem that at all costs the blood quantum of the brain should be independent of those nervous and chemical influences which alter the volume of circulating blood elsewhere. With his brain man lives and moves and has his being and as it controls so very largely the activity of other less important parts of the body, so also must their needs be largely subservient to its demands. Thus, while a continuous and adequate stream of blood feeds the cells of this "master organ," other and less important territories receive a variable supply. In the bulb is the centre which regulates like an automaton the cerebral nutrition. Sensitive to the slightest oxygen lack, it is able to promote constriction of the great splanchnic vessels with resultant greater flow of blood to the heart and brain; conversely, an embarrassment of riches causes splanchnic dilatation with consequent partial impoverishment of the cerebral blood flow. The skin and the viscera of the body share in this subservience to the requirements of the brain, but so important is the great splanchnic vascular area that Hill dubbed it "the resistance box of the circulation." Only when the vasomotor centre is rendered insensitive, as in shock, or when the great circulatory pump is exhausted, as in cardiac failure, does this resistance box fail.

Hill's proof of the contention of a previous experimenter, Munro, that the cranial blood volume is almost invariable, has been of enormous value in the study of the symptomatology of lesions of the brain. The Munro hypothesis became a Munro doctrine. The rigid, non-distensile skull is completely filled with membranes, brain, blood and cerebro-spinal fluid. With each systole of the heart a large volume of blood enters the cerebral arteries. Neither the brain nor the cranial membranes can reduce their bulk to accommodate the greater volume of blood, nor does the cerebro-spinal fluid respond by ebb and flow, as was proved many years ago by Elder. If the pressure of this fluid is temporarily raised, it rapidly falls by passage of the fluid into the cerebral veins and sinuses. The cerebro-spinal fluid pressure varies constantly as and is equivalent to the cerebral venous pressure. That this regulation of pressure within the subarachnoid space is necessary becomes obvious when we reflect that any rise in tension would effectively trammel the return of blood from the brain capillaries to the right auricle. These considerations provoke the conclusion that arterial blood entering the skull displaces a corresponding volume of venous blood. If, as Hill affirms, vaso-constriction cannot take place within the brain, then the pressure in the arteries and veins will passively follow any changes of pressure in the aorta and superior *vena cava* respectively, and any failure of return to the right side of the heart will automatically lessen the rate of flow of oxygenated blood to the cells of the brain. Hence follows that train of symptoms (breathlessness, dizziness, psychoses) which result from the acute onset of auricular fibrillation.

Another chapter of knowledge which we owe to the genius of Hill, may be summed up in the statement that the symptoms of tumour formation, hæmorrhage, embolism and allied conditions within the skull are the symptoms of cerebral anæmia. If the anæmia be of slow onset, as in tumour formation, the sensitive brain cells have time to accommodate themselves to a lower standard of nutrition. Hence the cyclonic symptoms of sudden and profound anoxæmia do not appear. The wind is tempered to the shorn lamb. But there is a limit to this elevation of the threshold of stimulation. As the tumour grows the veins and capillaries become emptied of blood. The venous pressure rises and the obstruction to the onflow of arterial blood becomes so complete that the cells manifest excitability by symptoms and finally die. Fortunately a localized rise of pressure is not transmitted generally through the cerebral substance, for the reasons that the brain is more plastic than

liquid and that its various portions, the cerebral hemispheres and the medulla and cerebellum, are divided into more or less discontinuous compartments. Thus a new growth forming in a hemisphere attains a considerable mass before deprivation of oxygen-carrying hæmoglobin affects the vital centres in the bulb. In recent years these principles have been applied by the present Professor of Medicine at the University of Sydney to the clinical interpretation of symptoms not only of cerebral conditions but of other vascular disturbances taking origin external to the brain.

For more than a quarter of a century desultory attempts have been made to controvert Hill's theory of cerebral vascular control. Many investigators, including Hürthle, Weber, Müller and Siebeck, Florey and Wolff, have advanced evidence in favour of the view that the vessels of the brain do not passively follow changes in general arterial and venous pressure, but have vasomotor nerves of their own. Their experiments were suggestive, but not final. More recently Stanley Cobb,[1] working in collaboration with Talbot and Wolff, has studied the effects of section of one cervical sympathetic nerve on the cerebral vessels of a cat. Under ether anæsthesia the left cervical sympathetic nerve of ten cats was cut and portion was excised, a rise in temperature of the ear and constriction of the pupil on the same side being taken as proof of successful section. A few days later an aqueous solution of Berlin blue was injected into the aorta. This operation was performed rapidly, so that the animal might not manifest the symptoms of slow asphyxia. Under ideal conditions the animal dies in five seconds. The brain was then removed, hardened, embedded and cut. Micrometer measurements revealed that more capillaries were open in the left than in the right hemisphere, the apparent loss of tone being well marked in the *area postcentralis* and *area occipitalis*.

Of course, Cobb's experiments prove nothing. The conditions were artificial and the experiments too few. More suggestive were the observations of Forbes and Wolff who, watching and photographing vessels through a window in the skull, saw them contract and dilate on stimulation of the cervical sympathetic and central end of the cut vagus respectively. But again, observations of pial arteries teach us little of cortical and subcortical vessels. Experiments with adrenalin have been equally unsatisfactory. Adrenalin has been used as a sort of Tom Tiddler's ground where golden proof of any hypothesis may be picked up. One observer finds that it causes vaso-dilatation, another that it promotes vaso-constriction. Impurity of the drug may have been responsible for the former findings, but until observers first prove the reliability of their instruments or media, their results must be suspect.

Nevertheless, strong evidence that spasm occurs in cerebral vessels is by no means lacking. That this evidence is clinical and not experimental does not vitiate its value. Though man lacks the distinction of being a laboratory animal, he offers daily to the philosophical observer information not yielded by the guinea-pig or the cat. The sudden onset of many cerebral phenomena and their equally sudden cessation are on our present knowledge inexplicable unless we postulate the existence of localized vascular spasm. Ephemeral vascular crises of the brain are known to every physician. Although immediately following their onset he usually makes a diagnosis of hæmorrhage, thrombosis, embolism or "areas of œdema," their dissolution within an hour or two necessitates a hasty revision of his opinion. Transitory attacks of aphasia, convulsions, vertigo and hemianopia are by no means uncommon and the badly named "intermittent claudication of the brain" has become a clinical entity. Even common clinical conditions like epilepsy and migraine are unintelligible unless they are due to oxygen lack. Some clinicians may talk vaguely of congenital predisposition, metabolic errors and allergic reactions, but the fundamental concept at the back of their minds concerning these diseases is, or should be, a sudden interference with the nutrition of cerebral cells. Contrariwise, their views are sound and fury, signifying nothing.

The existing variance between laboratory and clinical data on this fascinating subject should stimulate greater cooperation between the physiologist and the physician. Neither can solve the problems of disease without the other. For the present we may in a provocative mood charge the physiologist with failure to render sympathetic aid to his less learned brother in the solution of many of the problems of practical medicine.

[1] *The American Journal of the Medical Sciences*, October, 1929.

FRIENDLY SOCIETIES IN NEW SOUTH WALES.

THE report of the Registrar of Friendly Societies and Trade Unions in New South Wales for the year ended June 30, 1929, has been received. The membership of friendly societies for the year was 247,730, an increase of 5,531 or 2·3%. The receipts for the year by contributions and fees were £832,187 and for the previous twelve months £808,887. Sickness pay amounted to £319,787 or £1 8s. 9d. per adult member. Medical attendance and medicine absorbed £343,381 and funeral donations £77,928. The total expenditure for benefits during the year was £741,096 and for the previous year £712,597. The increased annual cost of sickness per adult member cannot, it is pointed out, be taken as a measure of the increasing inclination of members to claim benefits. Factors influencing the rate are the increasing average age, lower mortality rates and higher benefits paid by several societies and possibly some laxity in the administration of the rules. One point of interest is that "medical fees paid in advance by members, which should be held in trust, are being used in many cases to pay the ordinary expenses of management." Some societies overcome the difficulty by having a fund for medical receipts and expenditure only.

Abstracts from Current Medical Literature.

RADIOLOGY.

Motor Test Meals.

ALEXANDER B. MOORE (*American Journal of Roentgenology*, May, 1930) gives an appraisal of the motor test meal in Röntgen examinations of the stomach and small bowel. After a short history of the development of the method he states that by experience it has been learned that gastric residue after a motor meal six hours from its ingestion is due in most cases either to gastric cancer, gastric ulcer or duodenal ulcers. It has been found that 60% of gastric cancers, 45% of gastric ulcers and 28% of duodenal ulcers are accompanied by gastric retention. In the first group the retention is usually the result of obstruction by the tumour. In gastric ulcers the retention may be due to cicatricial constriction, but more commonly, reflex spastic contraction of the pyloric segment. Duodenal ulcer apparently produces gastric residue only by cicatricial stenosis of the lumen. Rarer causes of obstruction and gastric residue are ulcer in the pyloric ring, hypertrophy of the pyloric muscle, congenital pyloric stenosis, adhesions about the duodenum, benign tumour of the gastric antrum, cancer of the upper end of the jejunum and gastro-jejunal ulcer following gastro-enterostomy. Six-hour retention does not always signify organic disease and the author mentions as causes depressive emotions and migraine, *tabes dorsalis* and, rarely, cholecystitis or chronic appendicitis. In the latter conditions the spastic condition of the antrum sometimes observed appears to account for the delay. The converse to delay, that is, hypermotility, is stated to be of little significance. Summing up the points for and against the continued use of motor test meals, the author indicates that two of the main uses are, first, their directive value, calling attention to an abnormal condition and directing a more intensive search for an organic lesion, and, secondly, the bearing of the presence or absence of obstruction on the choice of treatment in a given case.

Bone Deforming Diseases of Adolescence.

A. L. GRAY (*American Journal of Roentgenology*, May, 1930) describes some of the deforming bone diseases of adolescence. The author thinks it unfortunate that most of these diseases are called by the names of those who were first to report them. No impression of the existing anatomical or pathological conditions is therefore conveyed. Osteochondritis of the bodies of the vertebræ described by Scheuermann, Calvé, occurs in children in the first decade and manifests itself in a flattening of the vertebral bodies which become wedge-shaped, and a condition of round back or kyphosis is produced. In vertebral epiphysitis which does not appear until the twelfth year, the epiphyses show irregular development giving scooped-out or notched appearance. The diagnosis of Calvé's disease from tuberculous spondylitis can usually be made by the absence of bone destruction or of paravertebral thickening. The diagnosis from compression fracture is sometimes very difficult in the absence of history. Separation of the head epiphysis of the femur is thought to be due to subacute or chronic epiphysitis and usually occurs in the first half of the second decade. The earliest appearance is a slight broadening of the epiphyseal line due to absorption of lime salts. *Osteochondritis deformans juvenilis coxæ*, Legg's disease, Perthes's disease, or Legg-Perthes's disease occurs in rapidly growing children without history of trauma. It is recognized only by Röntgen examination. The head epiphysis is flattened, the neck may be broadened and *coxa vara* may result. The epiphysis is often divided. If the acetabulum is deformed at all, the deformity usually occurs late, and is the result of mechanical distortion from the pressure of the deformed head. Some authorities, however, believe that a condition similar to that in the head epiphysis does sometimes occur in the acetabulum. Apophysitis of the anterior tibial tubercle or Osgood-Schlatter's disease usually occurs in active boys. The author believes that it is most probably preceded by an infective apophysitis and the separation usually present is the result of added trauma. Osteochondritis of the tarsal scaphoid or Köhler's disease manifests itself as an abnormal development of the scaphoid with mottling, flattening of the nucleus and irregular, delayed development. The author mentions *osteochondritis desiccans*, Preiser's disease of the carpal scaphoid, Kienböck's disease of the semilunar and Kümmells's disease of the spine, which usually occur after the second decade.

Diseases of the Colon.

HARRY M. WEBBER (*Radiology*, May, 1930) discusses the factors of error in the Röntgenological diagnosis of diseases of the colon. The author states that competency of the Röntgenological method in the field of gastro-intestinal diagnosis can scarcely be overrated. The opaque enema has remained the procedure of choice in the investigation of the colon. The contrast medium should be of the consistency of heavy cream and above the temperature of the body. Preparation of the colon for examination is important and castor oil has been found to be uniformly efficient. This is given the evening before and the following morning the distal part of the colon is cleared by plain enema. The technical difficulties encountered in the administration of enemata rarely prove to be insurmountable and it seldom occurs that a lesion, if present, cannot be exposed. The filling defect or organic deformity is by far the most common Röntgenological sign of disease. Carcinoma, diverticulitis, tuberculosis, localized encroachments on the lumen of the bowel by extrinsic processes, organic inflammatory stricture and syphilis, taken in the order of frequency of their occurrence, are processes which manifest themselves by a filling defect. Röntgenoscopy is essential and the radiologist must determine such items as fixation constancy during manipulation, mobility and palpability. The filling defect of carcinoma is annular, polypoid or obstructive and in general all are marked by jagged irregularities, constancy of situation and associated with a palpable mass. When stenosis is present, a bluntly rounded contour and fine canalization may be observed. A rare localized type of chronic ulcerative colitis may be confused with carcinoma. Deformities due to extrinsic lesions are of two types, depending on whether they are the result of an extraneous growth or a mass impinging on the lumen of the bowel, or completely inserting it, or whether they are due to spasticity caused by an inflammatory or exudative lesion in the immediate neighbourhood. Tuberculosis of the colon may be localized and confused with carcinoma or localized chronic ulcerative colitis, or it may be diffuse and confused with amœbic colitis and diffuse chronic ulcerative colitis. Chronic ulcerative colitis usually begins in the rectum and progresses proximally. Amœbic ulcerative colitis and tuberculous ulcerative colitis have their primary lesions in the cæcum and progress distally.

PHYSICAL THERAPY.

Diathermy and Inflammatory Pelvic Disease.

IN summing up the position of diathermy as an adjunct in the treatment of pelvic inflammatory disease, L. C. Scheffey and W. H. Schmidt (*American Journal of Obstetrics and Gynecology*, August, 1929) compare the use of diathermy in this condition with routine expectant treatment. One of the authors is a gynæcologist and the other a physiotherapist. The series of cases offered for analysis in the study, is divided into three groups according to the treatment adopted: Diathermy applied to the abdomen and vagina, diathermy applied to the abdomen and sacrum, and expectant treatment. The conclusions show that less technical difficulties are encountered in operations preceded by diathermy. Improvement and cures were about the same whether diathermy was used or not, and the length of stay in hospital favoured those not treated with diathermy. The small series shows that the numbers of patients cured and improved, with or without diathermy, were about the same and the stay in hospital even favoured those in the latter group.

Pain was not particularly relieved with diathermic treatment. The authors believe that heat is not an essential therapeutic factor, but that the favourable results are due to improved vascularity that follows the diathermy. On the whole the authors conclude that after "unprejudiced study" of the limited number of patients during the past year diathermy must be regarded as a helpful adjunct in the treatment of pelvic inflammatory disease in properly selected cases.

Cancer of the Cervix and of the Breast.

HENRY SCHMITZ AND WILLIAM HEUPER discuss the histological structure, clinical grouping and prognosis of cancer of the uterine cervix and the breast (*Radiology*, March, 1930). They give a description of the determination of the histological malignancy index and the classification of the clinical groups based on the extent of the carcinoma. The histological malignancy indices were determined in 225 cases of carcinoma of the uterine cervix and 136 cases of carcinoma of the breast. The end results were known in 100 cases of cervical and 71 cases of mammary cancers. The prognostic value of the histological malignancy index was tested against the end results obtained. The result is that the malignancy increases with an increase in the value of the malignancy index. In malignancy Group I the good end results were 100% in breast carcinomata and 80% in cervical carcinomata. In malignancy Group II the good end results were 60% in breast cancers and 50·7% in cervical cancers. In malignancy Group III the good end results were 37·5% and 25·8% respectively, while in malignancy Group IV good end results were not obtained in a single instance. The clinical grouping gave relatively similar values. The five-year end results in clinical Group I were good in 69·23% of breast cancers and 78·2% of cervical cancers. In clinical Group II they were 51·7% and 31·6% respectively; in clinical Group III they were 11·7% and 12·4% respectively, and in clinical Group IV they were 3·2% and 0 respectively. The study of the degree of histological malignancy and the extent of the growth gives valuable data in the prognosis and treatment of carcinomata of the breast and uterine cervix.

The Use of Rays of Four to Eight Ångström Units.

J. SAIDMAN (*British Journal of Actinotherapy and Physiotherapy*, April, 1930) deals extensively with the question of ultra-soft rays to prove whether the biological and therapeutic effects were due to the most absorbable part of these rays. He made (with R. Cahen) tests with the total radiation and with that filtered by the cellophane tube. They concluded that the erythematous effects were principally due to the softest rays, absorbable by cellophane of eight microns thickness (a hydrate of cellulose). The first irradiations with rays of four to eight Ångström units were applied by the author to his own forearm. Studying the appearance from hour to hour, he found that after a transitory erythema, due partly to the infra-red rays emitted by the filament, there remained, twelve to seventy-two hours after irradiation, a progressive erythema, becoming more and more pruriginous and pigmented in a somewhat premature way. Claims are made for curative effects in trichophytosis of eczematous pruritus, early psoriasis and lupus and failures are admitted in *herpes zoster* and in two cases of alopecia.

Multiple X Ray Carcinomata Following Psoriasis.

H. GOODMAN AND C. W. PRICE (*Archives of Physical Therapy, X-Ray, Radium*, May, 1930) present a case with illustrations of a woman who six years previously had received X radiation for psoriasis of arms and knees. The present carcinomatous lesions were so extensive that the patient was referred to the surgical department of the hospital. The authors state that physicians treated psoriasis long before X rays were discovered and suggest that it might be advisable to return to pharmaceutical therapeutics in such physiological conditions as acne and psoriasis. The use of the clinical sources of ultra-violet radiation as from the mercury vapour arc in quartz has been suggested and reports are available of its effectivity. Early excision of the ulcerating areas and skin grafting have cured the condition in some instances. Favourable effects by electro-coagulation, electro-desiccation, high frequency, endothermy have been reported in the literature at different times; each has its originators and proponents. Radium treatment of X ray cancers has also been proposed and has its champions.

Seminal Vesiculitis.

W. S. PUGH (*Archives of Physical Therapy, X-Ray, Radium*, April, 1930) presents results from one hundred and fifty-three cases of seminal vesiculitis. He claims complete cures in 60%. A block tin electrode about 12·5 by 17·5 centimetres (five by seven inches), with the body surface well soaped, is placed over the abdomen and the prostato-vesicle electrode is inserted into the rectum. The current is now turned on very gradually, that is, about 100 milliampères every thirty seconds until the point of tolerance is reached. The time of treatment is about forty minutes. One of the very great advantages of treatment is the early relief of symptoms. Often this relief occurs after the third or fourth treatment. Many patients, on being relieved, tend to stop at once and let the future take care of itself. They soon return, however. It is the author's custom to give these treatments twice a week and in a month there is usually a definite improvement. Dilatation of the urethra, followed by massage of the vesicle, is a practical adjunct and should not be neglected.

The Effect of Local Ultra-Violet Radiation on Resistance to Infection.

JEANNETTE CHAPMAN AND MARY HARDY (*The American Journal of Hygiene*, March, 1930) have investigated the effect of local ultra-violet radiation on resistance to infection. They treated rabbits with ultra-violet radiation for varying periods and then gave them subcutaneous injections of *Bacillus lepisepticum*. Unradiated rabbits were used as controls. They found that local radiation in light, moderate or heavy doses, single or repeated every day for two weeks, had no effect in preventing or mitigating the lesions produced by the *Bacillus lepisepticum*. It was thought that heavy doses might be harmful. It is possible that the effect of ultra-violet light may be less pronounced on an organism introduced subcutaneously than on one which must make its own way through the skin or on one which may be parasitic to the cells of the skin itself. Radiation with the right timing and dosage may have some effect in turning the balance in favour of resistance, but this result is difficult to obtain.

Ultra-Violet Rays and Lactation.

H. KÜSTNER AND R. BÖRNER (*Monatsschrift für Geburtshülfe und Gynäkologie*, March, 1930) describe their experience with ultra-violet rays in the stimulation of the breast in cases of deficient milk supply. The lamp was placed at a distance of eighty centimetres and the first dose lasted seven minutes and was gradually increased by three minutes until a maximum of thirty minutes was attained. The distance was gradually decreased to sixty centimetres. A full course of treatment consisted of twenty applications spread over six weeks—daily during the first fortnight, thereafter twice a week. A mild cream was applied to the skin between treatments. In all twenty-one patients were treated and the results were very disappointing. In an occasional patient a temporary increase in secretion was observed, but this was not maintained. The authors conclude that this treatment does not promise any lasting benefits and is not worth the time spent on it.

Radium and the Artificial Menopause.

STANLEY DODD (*Proceedings of the Royal Society of Medicine*, May, 1930) in discussing the production of an artificial menopause by the intra-uterine application of radium, states that the correct dosage is the smallest amount that will bring about the desired result with the least number of failures. Since he has had some recurrence of menstruation in patients over forty-five years of age after doses smaller than one hundred milligrammes, applied for twenty-four hours, he always uses a maximum dose as his optimum dose.

Special Articles on Diagnosis.

Contributed by Request.

VI.

GENERAL PARALYSIS OF THE INSANE.

THE diagnosis of general paralysis of the insane is one of the most important in the whole of neurology and psychiatry. Frequently the condition is easily detected, but at times the diagnosis is fraught with difficulties which can be overcome only by thorough investigation along mental, physical and pathological lines. The importance of an early diagnosis of general paralysis is much greater at the present time than it was in the past, for, following the introduction of malarial treatment, there is at least a 20% prospect of apparently complete recovery. Prior to malarial treatment general paralysis implied a uniformly bad prognosis. Rear-Admiral E. T. Meagher, in a report published in 1929 on the results of malarial therapy, found that of 624 general paralytics alive in 1923, but not treated by malaria, 90% were dead in 1927 (four years later), 8% were still in hospital and 2%, though bedridden and quite dependent, were recorded as discharged. In another series 152 patients alive in 1923 were given malarial treatment with the result that in 1927 (four years later) 45% had died, 30% were still in hospital and 25% were discharged. Again, of 286 general paralytics alive in 1924 and given malarial treatment, 42% were dead in 1927 (three years later), 32% still in hospital and 26% discharged. Meagher particularly noted the improved mortality rate and the improved general condition of those still in hospital. These patients were by no means selected, the prognosis in early cases being appreciably better than the above figures indicate. An indirect point in favour of early diagnosis is that it should lead to an examination of the patients' relatives with the possibility of detecting unsuspected syphilis, neurosyphilis or incipient juvenile general paralysis. The diagnosis of general paralysis is particularly satisfying to the diagnostician, in that it enables him to class the patient as one suffering from a definite disease, the cause, pathology and treatment of which are relatively well understood.

There are three main factors in the diagnosis of general paralysis of the insane: the mental symptoms, the physical signs and the pathological findings. It is commonly on account of the mental symptoms that a patient first comes under medical observation. The commission of some antisocial act or perhaps gross irresponsibility, confusion or failing memory, may be the first obvious symptoms of the condition. On the other hand, patients may first be brought to a doctor because of a defect of speech, through fits, transient palsies or retention of urine. Indeed, the early symptoms of general paralysis are so variable that medical practitioners of all kinds and whatever their specialty, may find themselves dealing with general paralytics and be in a position to diagnose the condition at an early stage. The pathological findings are far less variable than are the mental symptoms and physical signs, but taken alone these laboratory tests are scarcely sufficient to establish a diagnosis. They may, however, be of immense value in clinching the diagnosis in atypical cases or in directing special attention to general paralytics who at first present no symptoms suggestive of general paralysis. At this point it may be well to describe the essential laboratory tests and to consider their significance, deferring the consideration of mental symptoms and physical signs until a later stage.

Laboratory Tests.

The Wassermann Test.

The Wassermann reaction in the blood serum is strongly positive in 95% of general paralytics. In the remaining 5% the reaction is either faintly positive, indefinite or, rarely, absent. The Wassermann reaction in the cerebro-spinal fluid is positive in practically every case (100% is the figure usually quoted). One would have the gravest doubts as to the accuracy of the diagnosis of general paralysis of the insane in a person whose cerebro-spinal fluid presented a definite persistent failure to react to the Wassermann test.

A simple technique for obtaining cerebro-spinal fluid from patients (other than the completely bedridden) will now be described. The patient is induced to sit straddling a chair, that is, facing its back. He rests his head and hands on the back of the chair thus producing a dorsal convexity of his vertebral column. The operator then palpates the iliac crests, draws an imaginary line between them and so locates the spines of the fourth and fifth lumbar vertebræ, placing a finger on each. He places a third finger midway between them, but a little to one or other side of the middle line. With this finger (which indicates the region to be punctured) the operator exerts steady pressure on the skin for about a minute, so producing a somewhat blanched and pitted mark. When the skin has been cleaned with ether, the needle is inserted directly forwards until it is felt to penetrate the ligament and enter the canal. Pressure over the point of puncture appears to have a definite analgesic effect, rendering local anæsthesia unnecessary. Indeed, the pain of the local anæsthetic needle and apprehension associated with the pause while the anæsthetic takes effect, are probably more distasteful to a patient than is a sudden puncture through analgesic skin. Once the skin is pierced, there should be no further pain, unless, by inadvertence, the needle touches bone. When the needle is in the canal the stilette is withdrawn, the first drops are discarded and seven to ten cubic centimetres of clear fluid are collected. The neatness of the operation is enhanced if the lumbar puncture needle is dry sterilized in a large glass tube and the possibility either of failure or of obtaining blood-contaminated fluid is much reduced if special attention is paid to the sharpness and cleanliness of the needle. In general paralysis the fluid is usually found to be under increased pressure.

Estimation of Globulin in Cerebro-Spinal Fluid.

It is possible within a few minutes of obtaining the fluid to tell by means of the Pandy test whether or not the patient is likely to be a general paralytic. The test can just as readily be carried out by the general practitioner at the bedside as by the pathologist, for it consists of adding to approximately one cubic centimetre of saturated aqueous carbolic acid (Pandy reagent) one drop of cerebro-spinal fluid. If there is an immediate white, cloudy precipitate, the fluid contains an excess of globulin and the result of the test is positive. If, on the other hand, no immediate precipitate appears or if only a very faint opalescence is observed, there is no appreciable increase of globulin and the test is regarded as yielding no reaction. Failure to react to the Pandy test practically excludes general paralysis and a positive result, if in conformity with the symptoms and physical signs, strongly favours that diagnosis, although globulin may be present in excess in other forms of cerebro-spinal disease. Other tests for globulin in the cerebro-spinal fluid posssess few, if any, advantages over the simple Pandy test. With experience it is possible to make an approximate estimation of the globulin, describing the increase as "+," "++" or "+++."

Cytological Examination.

As an aid in diagnosing general paralysis, the following is a sufficiently accurate technique for estimating cells in the cerebro-spinal fluid. Centrifuge five cubic centimetres of fluid for twenty minutes, decant the supernatant fluid, collect the deposit in a pipette and transfer it to a slide so as to make a drop about one centimetre in diameter. Allow this drop to dry, stain with Leishmann stain and examine under a one-sixth objective. By counting the lymphocytes in a representative field one can report:

5 to 10 cells per field = a slight increase of cells
10 to 20 cells per field = cells increased, "+"
20 to 30 cells per field = cells increased, "++"
Over 30 cells per field = cells increased, "+++"

It is possible by this method to make an approximate report on fluids, even when they are slightly contaminated with blood. The cells are as a rule definitely increased in general paralysis of the insane, tabes and neuro-syphilis.

The Lange Colloidal Gold Curve.

The Lange curve assists in distinguishing between general paralysis and other forms of syphilis of the nervous system. The test is simply performed, but the preparation of both apparatus and reagent requires some care. The test tubes, flasks and pipettes should be washed only in freshly distilled water and they should be reserved for this test. The reagent is prepared by adding two cubic centimetres of a 1% solution of potassium oxalate to 200 cubic centimetres of freshly distilled water contained in a hard glass flask. The contents of the flask are then boiled and, while they are boiling, two cubic centimetres of 1% neutral gold chloride solution are added. If the colloidal gold solution is properly prepared, five cubic centimetres of it should be completely decolorized in one hour by 1·7 cubic centimetres of 1% saline solution. To perform the test, ten clean dry tubes (approximately one by seven centimetres) are placed in a rack, 1·8 cubic centimetres of 0·4% saline solution are added to the first and one cubic centimetre of saline solution to each of the others. After pipetting 0·2 cubic centimetre of the cerebro-spinal fluid into the first tube and mixing, one cubic centimetre of the mixed fluid and saline solution is withdrawn and transferred into the second tube. From the second tube, after mixing, one cubic centimetre is withdrawn and delivered into the third tube. This process of dilution is continued along the rack until the one cubic centimetre withdrawn from the ninth tube is rejected, so preserving the tenth tube as a control. To each tube five cubic centimetres of the colloidal gold reagent are added. After being left for from twelve to twenty-four hours at room temperature, the tubes are examined. The control should be a salmon red colour. Tubes which show a bluish tint are noted as 1, those showing lilac as 2, a distinct blue as 3, pale blue as 4 and complete decolorization as 5. The numbers representing the colour change in each tube are then written down in their correct series. A typical paretic curve is 555554321, a tabetic curve 222111000, a curve in neurosyphilis 122332000. With normal cerebro-spinal fluid none of the tubes shows any colour change. With blood-contaminated normal cerebro-spinal fluid the third, fourth and fifth tubes may show some change.

A paretic curve is almost invariably found in general paralysis and only rarely in other conditions, such as disseminated sclerosis.

It must be understood that these laboratory tests are described before the mental symptoms, not because they are regarded as of greater importance but because such an arrangement enables the psychiatric aspect to be presented with greater clarity.

Mental Symptoms.

In the early stage of general paralysis a typical case is characterized by a flippantly irresponsible attitude of the patient towards his environment, together with a loss of insight into his powers and position in society. Though this disorder may be insufficient to merit certification, it is the stage at which diagnosis is most desirable.

> A man, previously of good conduct, stole a bicycle and sold it to a stranger. On being arrested, fined and dismissed from his position he was quite unperturbed, said it was merely fun, that his job was scarcely good enough for him and that something really commensurate with his ability would soon turn up. He presented a few physical signs suggestive of general paralysis while his serological reactions were all typical of the condition.
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> Another such case is that of a man who at the age of forty-five, abandoned his position in order to follow some other occupation in which he was quite inexpert. He had great confidence in himself and spoke of his wonderful possibilities. None the less, he failed to prosper, though he remained perfectly satisfied, caring not a wit for the anxiety of his family at his failure. He continued thus until he developed such symptoms as led to his certification, though not before he had caused untold suffering and sustained irreparable financial loss.

The foregoing cases illustrate the onset of typical general paralysis in males. In females, amongst whom the condition is not common, the onset is usually insidious, the symptoms being dementia and increasing confusion. Rarely female general paralytics present the same symptoms as do typical male cases.

In the fully developed text book case of general paralysis the outstanding symptoms are confusion, dementia, anterograde amnesia, delusions of expansive and grandiose types, together with profound lack of insight. In general paralysis the confusion is particularly marked with regard to the coherence of events, for individual observances are sometimes made with considerable acuity. The amnesia, like that in alcoholic pseudo-paresis, is a loss of memory for recent events. It is worthy of note that as a rule no attempt is made to rationalize the grandiose delusions; thus, while a patient with delusional insanity will explain at great length how he acquired his wealth and rank, a general paralytic baldly states his delusions without explanation. Owing to his lack of insight a general paralytic is able to preserve a sense of well being which is in marked contrast to his actual state.

From the view point of diagnosis it is scarcely necessary to mention the late stage of general paralysis as one of complete dementia, confusion and dependence.

Physical Signs.

Abnormalities of the pupil are most helpful in the diagnosis of general paralysis. Commonly, from the commencement of the disease the pupils react either sluggishly or not at all to light, while their reaction to accommodation is of normal type. Occasionally there is no reaction either to light or to accommodation. In many cases the pupils are unequal, irregular in outline and eccentric in position. The consensual reflex is commonly absent, even in early cases.

The deep reflexes are brisk, but unassociated with clonus, the plantar responses are flexor and the cutaneous reflexes present, in fact there are no signs of upper neurone lesions, except as transient occurrences following seizures. The tone of voluntary muscles is sometimes defective and there are tremors of the face, tongue and hands. Motor incoordination is manifested, particularly in slurring of speech, making the pronunciation of such test phrases as "Methodist Episcopal" and "Royal Field Artillery" a matter of great difficulty. In some instances there is unsteadiness in gait. As the disease advances, convulsive seizures, either epileptiform or apoplectic, occur, leaving in their train transient palsies. Congestive attacks in which pyrexia, coma, dyspnœa and glycosuria occur, are common in the later stages of the disease.

It is unusual in general paralysis to find evidence of somatic syphilis, old gummatous scars, syphilitic periostitis *et cetera* being points against the diagnosis of general paralysis. An exception to this is that some aortic incompetence due to dilatation of the first portion of the aorta is not uncommon.

Atypical General Paralysis.

The prominent symptoms of typical general paralysis having been noted, attention will now be drawn to atypical forms of the disorder. The form general paralysis is likely to take in the illiterate and in juvenile paralytics is one of simple dementia—a progressive mental enfeeblement without delusions or other characteristic phenomena. In other cases acute confusion masks symptoms which would suggest general paralysis. From time to time apparently typical acute mania develops into definite general paralysis, indicating that there is a maniacal form of the condition. In some instances the usual euphoric mood is replaced by one of depression, allowing the patients to be classed, mistakenly, as melancholics. However, other symptoms, such as amnesia and confusion, together with physical signs and serological reactions, usually make the diagnosis clear. In some cases from the onset seizures are the most prominent feature of the disease.

Differential Diagnosis.

In distinguishing between general paralysis and other forms of mental disease the diagnostician is greatly helped by the results of routine blood Wassermann tests in all patients showing mental disorder, for the process is really one of detecting atypical cases of general paralysis amongst them. Lack of insight and irresponsibility, together with suggestive physical signs, enable most atypical general paralytics to be distinguished from patients with acute mania, melancholia, dementia *et cetera*. Skilled nurses in their constant observation of the patient's conduct can sometimes draw the doctor's attention to otherwise unsuspected general paralysis.

Insanity due to a gross brain lesion (be the lesion due to arteriosclerosis, tumour or other form of cerebral disease or injury) can be distinguished from general paralysis by the presence of definite emotional instability, not present in the latter condition. In addition, while insight is lost in the latter, in the former, even when delusions are present, a considerable degree of insight is retained. The absence of characteristic physical signs and serological findings complete the differentiation of the former from the latter condition.

The mental symptoms of alcoholic pseudo-paresis so closely resemble those of general paralysis that the diseases cannot usually be differentiated by mental examination. The physical signs in the former are not as pronounced as in general paralysis, though there may be some sluggishness of the pupils, tremor and slurring of speech. The presence of signs of peripheral neuritis would indicate the former condition. Practically the distinction depends upon the serological findings.

It is important to distinguish between general paralysis and neurosyphilis associated with mental disorder, for antisyphilitic treatment is usually effective in the latter condition. Mental examination alone is usually sufficient, but finally the differentiation rests upon serological findings, namely, a paretic colloidal gold curve and a definite excess of globulin (not often present in neurosyphilis).

Tabo-paresis is readily distinguishable from general paralysis because of the presence in the former of physical signs due to lesions in the sensory paths. In tabo-paresis either tabetic or paretic symptoms may predominate, the mental symptoms of the latter being just such as occur in general paralysis.

In conclusion it may be said that few general paralytics will escape early diagnosis, if it is made a routine to ascertain the blood response to the Wassermann test in every case of mental disorder, no matter how unlike general paralysis the condition may appear. Following the receipt of a positive report, each case can then be investigated by such methods as have been indicated.

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Medico-Legal.

DAVID BAIRD HAIR *Versus* ROBERT JOHN PRITCHARD.

IN the Supreme Court of New South Wales an action was recently brought by David Baird Hair against Robert John Pritchard, medical practitioner. The case was heard before Mr. Justice Ferguson and a jury of four. Mr. A. B. Shand, K.C., and Mr. W. J. V. Windeyer, instructed by Windeyer, Fali and Company, appeared for the plaintiff, and Mr. A. H. M. Feez, K.C., and Mr. R. M. Sturt, instructed by Mr. Ernest A. Milford, appeared for the defendant.

The action was brought against the defendant for alleged negligence in his treatment of the plaintiff who was suffering from an empyema. During the withdrawal of pus from the pleural cavity of the plaintiff the needle broke off at the butt and was not discovered until a skiagram was taken some months later. This skiagram showed that the needle had become embedded in the lung tissue.

The various acts of negligence alleged were as follows:

1. That the needle which the defendant used was not a suitable one for the withdrawal of pus; in other words that it should have been used only for exploratory purposes.

2. That the defendant, once he had detected the presence of pus in the pleural cavity, should not have withdrawn any pus by means of a syringe, but should have operated immediately. This allegation of negligence was practically abandoned during the hearing of the case.

3. That the defendant should have realized the likelihood of the patient coughing violently and so should not have relaxed his hold on the needle, but should have got the nurse to empty the syringe.

4. That the defendant should have tested the needle beforehand by bending it and exerting some pressure and strain on it.

5. That after the needle broke and could not be recovered, the defendant should have immediately informed the patient or some near relative.

6. That a skiagram should have been taken as soon as possible.

7. That the defendant should have consulted another doctor.

Defendant's Case.

ROBERT JOHN PRITCHARD: I was first called in to the patient on the first of January, 1928. He was in bed and complaining of pain. He was complaining of pains in his chest and I examined his chest carefully back and front and he complained principally of a tender spot which was just opposite the spine of his scapula. He was in considerable pain and in bed. I ordered poultices to be applied and I ordered him liquid nourishment and attended to his bowels to see that they were well opened and gave him medicine with the idea of relieving the pain. At that time I reserved judgement to a certain extent as to the cause of his trouble, because he had pleurisy there and there was a history pointing to bronchiectasis. That history was a cough extending over a long period, with sputum particularly in the morning. Of course I had not seen any then. He told me that he coughed sometimes a cup full in the morning. He did not tell me what sort of sputum it was. I did not gather at first that the sputum was foul-smelling. The symptoms pointed to a bronchiectasis and with a bronchiectasis one always has to bear in mind the sequels which might develop as the result. One of the commonest of the sequels, I think, is that they get patches of pneumonia and a patch of pneumonia would give rise to dulness on percussion. It also will give rise, if it is near the surface, to pleurisy and in this case there was evidence of a pleurisy over a patch, I might say, perhaps as big as a half crown at the time I first saw him. His temperature was 102·5°. His pulse was rapid, he was a very sick man. His wife told me that his expectoration was of long standing and the foulness of his breath, and I came to the conclusion he had a secondary lung abscess, secondary to his bronchiectasis. I think it was on the fourth or fifth day after I saw him that we got the nurse. He required attention night and day. For a day or two it looked as though the thing might be quietening down, his expectoration was foul and in some of these cases of lung abscess, if they are small, they will burst into the bronchus and the patient will cough up the pus and the necrosed material and they will tend to clear up, but after a few days he seemed to be slipping again and there was evidence that the disease had ruptured into his pleural cavity. In some of these cases, if it is only a small leak, first adhesions will form in the pleura and close off the abscess and then you have a localized empyema of various size.

About the twelfth day it seemed as if the amount of infection and probably the formation of pus had extended, and about the eleventh or twelfth day from the time I first saw him I came to the conclusion that there was probably pus at the base of the pleural cavity. On the

night before I tested him, he was very bad and he was delirious and a very ill man. On the thirteenth I explored. I did it with a Burroughs Wellcome glass syringe and a needle, the usual needle for exploration purposes. I have used a syringe like that for many years, not this particular one, but one of the same make. When I used the needle, as far as I could see, it was perfectly sound. It was clean, it was not stained or rusty and it was perfectly firm in the socket. In order to use it you take it out of your case and you have a look at it and see that it is perfectly all right and it is not long in the socket. There was no obvious fault in it, it had been used on a previous occasion, it was thoroughly sterilized by the nurse. I selected a spot. I put the needle in just below the point of the scapula between the eighth and ninth rib, that is just below the shoulder blade. What I did was that I exerted a gentle pull and pus came into the syringe. I believe I did have the syringe on when I put the needle in, although in some cases we put the needle in without. If you have fluid in your lung, the air does not go in, as the fluid stops it. There is nothing in that suggestion of Dr. Hair that you might set up pneumothorax. I put the needle in and then I drew out the pus and I drew it up until I got it about just a convenient place; this is marked on here up to 20 and then I removed the needle so. I removed the syringe, leaving the needle in position and emptied it into a dish. Then realizing that he had a large amount of pus in his chest, I thought I would withdraw more so as to ease him down a bit and to help his breathing and to obviate the shock which occurs when the chest cavity is opened. So I took off another syringe full very slowly and he appeared to be standing it very well. I then took a third syringe full and sometimes these syringes will just catch a bit at the top, so leaving the needle in position, I took the syringe in my hand to get it into the bowl and I heard the patient cough and I looked round and this piece was lying on the towel. I think they call it the butt. He gave a short, sharp cough. I don't know whether it was one cough or more, but I think two or three. The man had been coughing a good deal, but at that particular time when I was doing it he had not coughed until then and the needle disappeared. I know that some men only take one lot of the pus off. I told the patient that it would be necessary to have an operation which would include the removal of portion of his rib to drain the abscess cavity. The determination to drain the pleural cavity had nothing whatever to do with the needle. It had to be drained. I did not think it was necessary directly after I found the needle had broken to have an X ray taken. It would have been impossible at any time to have performed an operation to take that needle out because the man would have died. The operation took place about one hour and a half after. Dr. Eakin gave anæsthetic. I removed portion of the rib and opened the pleural cavity and pus poured out, about two pints. I let it out slowly, using my finger in the wound. The pus was exceedingly foul, so foul that I almost vomited during the operation. That disclosed to me that the man was desperately ill and the stink of the pus confirmed one's diagnosis that it was from a lung abscess or from a bronchiectasis. I performed that operation in his house at his request. I wanted him to go to the hospital. When I did the resecting of the rib I did not see any sign of the needle, I neither saw it nor felt it. I put my finger just inside and felt above the spot where I put it through and I could not feel it. I came to the conclusion that the needle had dropped into the pleural cavity. In that position it would not be likely to do any harm. I did not tell the patient about the breaking of the needle, I thought that it would probably have been the last straw. He was a highly nervous man, he had had a lot of ill health and he was nervous. I might have told his wife and in that case the patient would probably have known and in the interests of the patient I did not tell either. I did it in the interests of the patient. The wound absolutely closed. I dressed him last on the tenth March and he left for Sydney or somewhere. After that I did not see him again until the following October. He was feeling a little off colour; the wound was dry and healed. He was looking much better, in fact a different man. After October I did not see him until the end of January, 1929. He came in and told me he thought he had a cold, he thought he had a touch of influenza. Knowing his condition of his lung trouble, I examined him and the wound was still healed but over the same spot where he had complained of the tenderness previously, he was tender on pressure, markedly tender on pressure. To my mind that indicated that the abscess in his lung was beginning to form again. The needle was not anywhere near that spot and at any rate I was satisfied in my own mind that it had nothing whatever to do with it, because he was not tender over the area where the needle would be lying. I say that the wound healed up within about two months of the first operation and that would indicate that the needle was having no ill effects whatever. I next saw him on the seventeenth March. In the meantime he had been to Armidale. After he returned from Armidale he had a discharging sinus in the old spot. He told me that he went up to Armidale and while he was up there he got very sick and saw a doctor and that an abscess had formed on the old wound and the doctor had opened it and let out some pus. Knowing the man's condition, the fact that he had an abscess on the lung, that was not to be wondered at, it was quite a usual thing. I explored the sinus. I found that the sinus travelled right up, not a sinus which was bent down, the probe went straight up towards the spot where his original tenderness showed, showing to my mind that the abscess in his lung had opened up and discharged again. It had no connexion with the needle, because the sinus extended well above. I did not go below the wound. Putting in your probe, it did not go down, it went up to the original point of the abscess in the lung. The original abscess was in the upper part of the lung. I last saw him professionally on the twenty-seventh March.

I never on any other occasion except the one when I put the probe up the sinus, ever did any probing of his wound except in the ordinary dressing; you use a probe to put in the gauze. It is true that after the first operation I made a second incision in the patient. I made an incision at a spot just above the stitches I put in. Just above where the stitches were, that I put in, there was an elevation of the skin and a little reddening of the skin, showing that he had a secondary infection and there was pus there. I think it was probably just above where the stitches went in. I injected a little "Novocain" and I opened the skin and opened a small abscess cavity and dipped some gauze in iodine and put some into it. It was just near the skin, like you would cut an ordinary boil. I did not put a deep cut into the patient like I did on the first occasion, it was just merely a skin incision to let out pus from a surface abscess. With regard to a person who has suffered from an empyema caused by a bronchiectasis, the wound does heal for a time only, will heal temporarily, but in the course of time breaks down again and pus is formed. It acts really as a safety valve for the patient.

Cross-examined by Mr. Shand: I said I examined it, but you do not take a needle and see whether you can break it, because you could break any needle. I say it did not snap with my using it. I realize the danger of a cough, but breaking a needle is quite a different thing. I did not realize that a cough would break a strong, sound needle. I tested this needle in the usual manner, but I did not take it in my hand and bend it. I admit that I used my syringe on it, but I was not rough in the use of the syringe. I just held the needle in position while I detached it.

I suppose you recognize that if a man were careless in detaching a needle from the syringe he might very easily break it? No, he would have to be pretty rough. If he used any force to detach it, the rib would not act as a fulcrum because it was not touching the rib. It was not close enough to the rib for that. You go between the ribs as far as possible.

Have you entered the fact that you lost a needle in your diary? No, as a matter of fact there is no entry except just that there has been an operation. I do not write up my operations beyond that.

I am asking you whether you told the nurse on this occasion that it would be better not to tell Mrs. Hair or

the patient that the needle had been lost lest it should upset them? Yes, or words to that effect.

Thinking of foreign bodies, do you agree with this: "Sooner or later inflammation and suppuration take place in the lungs, with multiple abscesses, or the patient may develop bronchiectasis"? If there was a foreign body in the bronchus, yes.

Is it not a general and recognized fact that a foreign body in the lung, although it may remain quiescent for a long time, is liable to break out and cause suppuration? Not as a rule. If it does, it is soon after it gets into the lung.

Was there not a passage through this drain? The discharge diminished rapidly from day to day and finally healed. If the discharge had been coming as the result of suppuration around the needle, it would have been very unlikely to have healed as rapidly as it did.

Was there an X ray plant in Murwillumbah? Yes, I have one in my surgery and could have detected the needle at any time.

Were you not searching for the needle when you made that other cut? No, I was not. It was just a superficial abscess due to secondary infection.

Did you ever say to anyone: "Of course I may be wrong, as an operation to remove the offending foreign body may be necessary"? I may have done, but I do not remember whether I did.

I have no recollection of the plaintiff asking me for a bill. As a matter of fact I thought he had an account, but I do not send my accounts out. I could not say how it was that he did not get an account. I had an accountant who was supposed to be sending the accounts out and he got very much behind.

MATTHEW JOHN EAKIN, practising at Murwillumbah, who gave the anæsthetic for Dr. Pritchard, corroborated Dr. Pritchard with regard to the actual operation and the patient's condition.

Cross-examined by Mr. Shand: Did you know there was a needle in him when you were giving the anæsthetic? No, I first learned there was a needle left in him on the morning I arrived in Sydney. That was the first authentic news I had of it, and that was last Thursday morning.

Dr. S. A. Smith, Dr. R. Scot Skirving, Dr. Hugh Poate, Dr. M. J. Eakin, Dr. George Bell, Dr. Archie Aspinall, Dr. Edwards, Dr. V. Benjafield, Dr. C. G. McDonald, Dr. C. E. Corlette and Dr. J. L. McKelvey were called on behalf of the defendant.

STUART ARTHUR SMITH: I have known exploratory needles to break. I understand that it has been suggested that you should first of all try and see if you can break them, but I think that would be a very unwise procedure. You might half break it and then the break would be complete when in use.

It has been suggested that the doctor had no right to take more than one lot of pus out for exploration purposes. What do you think of that? It is nonsense. It is a very common practice to reduce the pressure of pus by taking out more than one syringe full. I say that after the war the aspiration of pus, the drawing out of pus through a needle, was seriously advanced as the most important part in the surgical treatment of empyema. I understand it has been suggested that if the syringe were withdrawn like that and the needle left in the chest wall it might tend to cause pneumothorax. I would say it was impossible to produce a pneumothorax in the case of empyema without using the pressure, that is to say forcing air in under pressure. Once there has been an empyema caused by a bronchiectasis, it does not heal up and stay healed up; the characteristic condition of it is to be discharging at intervals.

Looking at those X rays, the needle appears to be in the centre of the lower position of the left lung towards the back part. The lung is quite insensitive to pain. No sign of any inflammatory tissue round the needle. Lung is extraordinarily tolerant of foreign bodies. I think the right practice is not to inform the patient where a foreign body is doing no harm, because it worries them tremendously. My own practice is usually to inform some near relative who can be trusted not to reveal it to the patient. I did tell you of one particular case in which I lost a large hypodermic needle. I did not recapture it. It is still in the person. It has never done any harm.

Dr. McDonald and I examined the patient about a week ago. He was not a very healthy looking man; he gave me the appearance of having been suffering from toxæmia or poisoning of some kind and then we found there was a curious condition of the clubbing of the ends of the fingers. That was a clear indication that he had had some long-standing chronic disease of the lung or heart. I came to the conclusion that there was no active trouble in the lung on the day of my examination. That is to say, he was suffering from a chronic disease of old standing that was not then active. The needle is there in his lung, but I do not think it is doing any harm.

Cross-examined by Mr. Shand: I am taking a case now where you know there is a foriegn body and you get a discharge from an old wound, I suppose the first thing you would do would be to have an X ray? Yes.

Don't you think a medical man is taking a big responsibility on himself when he leaves a needle in a man's body and does not let the man know so that he can have an opportunity of saying what is to be done? No, I think the doctor's responsibility is the health of the patient, and if in one's judgement the health of the patient is going to be materially improved by that knowledge, then I think he should know, but if his health is going to be deteriorated by that knowledge I think he should not know. I personally would tell one of his relatives for my own protection.

Do you say that you could not by exercising ordinary pressure on those hypodermic needles you are speaking of have discovered that they were faulty? I might have, but it is too risky a business to do that. You are rendering it more certain that if it is going to break, it is going to break inside the patient.

If you diagnosed the patient as suffering from a long-standing bronchiectasis in both lungs, would that be a matter that would be mentioned? Yes, as a matter of fact prior to the needle going into that man at all, I would not have recommended the plaintiff for acceptance by a life assurance company.

If the needle in this case had been going to give trouble, that is to say going to set up anything in the nature of inflammation of the lung, how long after it got in would you expect that to happen? Within two or three weeks. The trouble nearly always starts at once, but it becomes obvious in about three weeks' time.

ROBERT SCOT SKIRVING: I have had my fingers in the lung pretty often in my life, but I do not think there is practically any feeling at all in it, a needle or foreign body in the lung tissue is not likely to move at all. A foreign body lying in the lung tissue would be most unlikely to do any harm; I might practically say no.

Is there any way of discovering whether these needles will break? As a matter of fact, being a Scotchman, I distrust them all. I always look upon them with suspicion, but I have a look at them and see that they are all right, and I say to myself "We will hope for the best." If you monkey about with a needle with a bad shaft the probability is that it will break with you. I let sleeping dogs lie.

What do you say to the suggestion that taking away two or three syringefuls of pus first of all before opening the cavity and draining it is bad practice? I say that it is nonsense. As far as I can judge from that X ray, the needle is not doing any harm. Even I, who do not pretend to any particular expert knowledge on the subject, can see that there is no sign of any inflammation there. It is lying there snugly at rest. A large bronchiectatic cavity in my opinion would not ever completely disappear. If this man had a cough I think he would be one of the coughing people probably for ever. I am chief medical adviser to the Australian Mutual Provident Society. Judging by this man's history of what I see in these X rays, I would not advise the acceptance of this man. On these X rays, quite apart from the needle, he would not have a chance.

Cross-examined by Mr. Shand: Suppose you find a man with a healthy lung, and he came along to you as the supreme authority on assurance and he had a needle in his lung, would that affect you? No, because there are

dozens of people going about with all kinds of silver, lead, nickel and iron in them and unless it has done any harm I would not do anything to them.

I cannot see any signs of inflammatory action round it. It is lying quite quietly, simply and at rest.

Of course a dead man does that? Quite so, but he does not come up for insurance.

You don't think the needle might get affected by passing through the pus and then into the lung? Why the whole was affected. It is a case of autoinfection. The needle with pus in it passing into the lung was like carrying coals to Newcastle.

You mean that the lung was already infected? Yes, the chance of any further harm to the lung is negligible.

HUGH RAYMOND POATE: The plaintiff's brother, Dr. Gordon Hair, saw me about him early in April, 1929, and he then came into hospital under my care on the sixteenth April at Wootton Private Hospital and he was there until the fifth May, 1929. He was originally brought to me because of a needle in the lung and I was asked whether I would remove it, but after investigating his condition I advised against any attempt to remove that needle. I advised him that if there was to be an operation of any kind that it would be because of his lung condition and not because of the needle. I advised an X ray. When I got the "Lipiodol" X ray, I found that he had a very extensive condition affecting both lungs. When I saw him he had a sinus discharging in the side of the chest. The probe went in approximately six inches up into the lung tissue. From the knowledge I have now of the position of the needle, in my opinion the sinus track was in a direction away from the needle, it did not track direct to the needle. There was no track as far as I could see going towards the needle. I did not consider the needle was doing him any harm. I told him so and I told his brother so too. From the X ray there is no evidence that I can see of the needle doing any injury at all. The only other evidence I had as to his condition was his own history. He told me that he had had chest trouble for a very long time. At the time I saw him, his chest was full of signs of disorder of the lungs and he was coughing up this foul and offensive sputum which is characteristic of the disease. He showed the usual clubbing of the fingers. I saw him again on the sixteenth October. There was a general improvement in his condition. His original history led me to believe that what had happened was that one of the dilated pus sacs in his lung had become inflamed and had tracked through to the surface of the lung. That was the explanation as to why he had a sinus. If this needle had passed through the pus you could not say for certain whether that would be likely to cause any injury, but it is obvious in this case it had not. I disagree with the suggestion that Dr. Pritchard was wrong in taking three syringes full of pus before operating for the drainage of this pleural cavity. As a matter of fact it is a very good thing to do for several reasons, one is relieve the tension there and, secondly, it is a very common practice to evacuate the cavities of that character—withdraw the pus altogether. In some cases you can save the patient an operation. There is nothing wrong in doing what Dr. Pritchard did, if when he took out the first lot of pus, he took the syringe off the needle and left the needle in; that is the only way to do it. I would not puncture him again. It cannot cause a pneumothorax when there is pus present. I think one would under ordinary circumstances advise the patient to have an X ray taken just to see that the needle, if it is left in, is doing no harm. The good it would be is to relieve your mind, that the needle was in a position that would not be likely to cause damage. I have known of a foreign body to be in a lung without moving for sixteen years. The sinus is connected with his lung, an abscess cavity, not with the foreign body. I suppose one is more or less always prepared for a patient to cough. You do not make any special preparations for it. Frequently when you are aspirating a chest the patient coughs, but I have never worried about it myself.

Cross-examined by Mr. Shand: You expressed to Mr. Windeyer a rooted objection to actions being brought against doctors? No, I said it was a regrettable thing for the community at large that a patient should express his gratitude to the doctor who saved his life by taking an action against him for an accident which was really part and parcel of the procedure incidental in the treatment of his disease. I said also that there were too many actions being taken against doctors with regard to fractures.

GEORGE BELL (*cross-examined by Mr. Shand*): I suppose you recognize that with X rays except for the discovery of foreign bodies it is just about as unreliable as you can have it? Well, it is an unreliable thing.

Have you heard of cases in your experience where a malignant growth has been diagnosed in the body and when opened nothing of the kind has been shown? Yes.

And if the man had been taken across straight away and an X ray taken, don't you think there would have been every prospect of recovering that needle without difficulty at an operation an hour afterwards? No, I should think it might prove very difficult to recover it. Sometimes they are a good distance out, the X ray people and we have to suffer for it. Looking at it now, I cannot see that the X ray would have done him any good. As a matter of interest it would let the doctor know where the needle was. If I X rayed a patient and found there was a foreign body in his lung that was not causing him any trouble, I would not tell him it was there.

Jury question: Do you think there would be sufficient resistance inside the man's body when he was detaching the syringe from the needle to cause the needle to break to a certain extent, that it might crack it and then the coughing afterwards might settle it? Yes, it would be possible.

JAMES GEORGE EDWARDS: A foreign body in the lung tissue does not change its position. I have seen three needles in the lung beside this one. One I have seen every year for about the last six years and that has not shifted and is not doing the person any harm.

I say I think an X ray would show fibrosis. From what I see of the X ray and the position of the needle, there is no possibility of that needle causing the outbreak of the wounds in that man.

CHARLES GEORGE MCDONALD: I examined the plaintiff a week ago in conjunction with Dr. S. A. Smith. Altogether I found nothing that was abnormal. On physical examination there was nothing to indicate that a foreign body in the lung was doing any harm.

There is a definite distinction between foreign bodies which go by way of the upper air passages into the larger bronchial tubes and foreign bodies which penetrate through the chest wall. In the first class the results may be very serious. In the second case everything depends, firstly, on the size of the foreign body and, secondly, the infection carried in with it. A small foreign body such as a needle would not be likely to do harm unless it carried infection with it. If harm were to be done by any foreign body, the harm is done very rapidly and quickly, certainly within twenty-four hours.

With regard to the needle going through pus, it would do no harm because the patient had contracted a certain amount of immunity.

Cross-examined by Mr. Shand: Do you think it wrong practice to exert some bending pressure on a needle to see whether there is a palpable defect in it? Yes, I do, I think that will throw a strain upon its weakest point. I have discussed it with several medical men who are quite interested in this suggestion that a needle should be tried from side to side.

Could rust attack the needle now? I should say that the needle is already discoloured. Not rust in the ordinary sense that there is dust on the needle, but the needle would be discoloured because iron is present in the blood cells.

Any roughening by rust? No, but discoloured.

ARCHIBALD JOHN ASPINALL: The usual thing is that a bronchiectasis keeps on indefinitely. The man gets well for long or short periods and then relapses.

These recoveries from bronchiectatic infusion into the pleura forming empyema are very rare? The ultimate recovery.

VIVIAN BENJAFIELD: There is no way in which you can find out whether there is any latent flaw in a needle, even if it looks perfect. In this case the needle comes through the infected tissue into healthy lung and although it must carry some pus cells with it, it does not suppurate because the rest of the tissues are immune.

I think it is in the best interests of a patient not to tell him—do him much more harm than good.

Cross-examined by Mr. Shand: You are very largely a professional witness? No, I specialize in the after-effect of injury. As such I am called in to give evidence, but in the great majority of cases my opinion is against the people who consult me.

You do advance some novel theories in Court? I have never known that they were novel. I can base everything that I advance on technical grounds.

I think you gave evidence in a case where a man was being prosecuted for driving under the influence of liquor? Yes.

And although the man admitted that he had had several drinks; you put it down to autointoxication? I have never used that term in my life.

You say you would not tell an individual or his relatives if you broke a needle in him? I certainly would not. If I put myself before him, I would tell some of them, that is in my own interest, that is if I were a bit cowardly and wanted to protect myself.

Don't you think that a medical man who has lost a needle should as soon as possible ascertain where it is? No.

Even supposing it was for his own satisfaction? No.

And don't you think that the man himself who has got a needle in him ought to have the option of saying whether he will consult another doctor?

His Honor stopped this question.

CYRIL ERNEST CORLETTE (*cross-examined by Mr. Shand*): You say that if there is an empyema caused by bronchiectasis it is bad practice to allow the wound to heal? That is my experience.

Is that your opinion, that it ought always to be kept open? I would certainly keep it open for a year or two at least.

JOHN LAWRENCE MCKELVEY: There is a typical smell in that chest sputum from bronchiectasis; it has a very characteristic odour. In the case of pneumonia you do not get that foul-smelling sputum, not in ordinary pneumonia that causes empyema. I have known the usual exploring needles to break. You can look at the needle and look carefully at the joint. They almost invariably break where the end screws on. They frequently rust through there. If you look carefully at them and you are satisfied, you assume that the needle is all right. I do not think it would be advisable to try and bend that needle before you use it to see if it has a flaw in it.

Cross-examined by Mr. Shand: When you are using one of these syringes with the handle attached when you are working between the ribs you have to be careful when you take it off not to put pressure on it? Yes, you don't want to bend your needle laterally.

When a medical man is exploring by himself without assistance, he could not empty the syringe without taking his hand off the needle? Personally I have emptied a syringe dozens of times and I have had to take my finger off the needle.

Does holding the end of the needle lessen the liability of it breaking on coughing? You can keep it more directly into the chest so that the ribs will not cut it like a scissors.

MAY PRENDERGAST: I was housekeeping for Mrs. Hair from January, 1924, to February, 1925, Mr. Hair in a bad state of health during that time. Had a bad cough and spat up large quantities of sputum. It was very yellow and streaked with grey streaks and had a very offensive smell. Mr. Hair nearly choked on one occasion. It used to make me vomit sometimes when I was emptying the receptacle.

ELIZA MARY REEVE, a duly certified nurse, nursed Mr. Hair during his illness and was present at his operation by Dr. Pritchard. When doctor was giving me his orders for the treatment of the patient afterwards he said: "About the needle, I take entire responsibility myself. The patient must not know in his condition." I have attended other cases of operations for empyema and I have seen eminent surgeons perform these operations. As far as I could see doctor performed the operation with all skill and care. The doctor put in the drains with the assistance of a small silver probe. Beyond that probing I did not see him do anything of that nature.

Plaintiff's Case.

DAVID BAIRD HAIR: Prior to this particular illness I was always in good health. For a long time I have had a cough. They say I have had a cough ever since I was about three years of age.

Within a week of the operation on January 13, 1928, the doctor said it seemed to be pocketing up and that he would put in another drain, and he gave me a local anæsthetic just in the back and made an incision and put in a gauze drain. The incision was above the first incision. On one occasion when he probed the wound, he said could I feel anything and at one time he said: "I thought I felt a piece of bone there." I remained on the mountains until the end of April, 1928. The wound healed up whilst I was on the mountains. I then went to Queensland to a dry climate and returned on July 1, 1928; the wound had healed up and I was much better. I felt off colour again towards the end of the year. I felt the pain round in the back. When I would cough, I would feel extra pain and I would keep on coughing and sometimes I would bring up blood sputum. That continued right up till February. I did not get any better, I was getting worse. The next thing was that I proposed to go to Sydney *viâ* Armidale and I got as far as Armidale. It was early in February that I went to Armidale. I felt very sick and ill in Armidale. I felt so ill that I saw Dr. Bryden. A big lump formed on the site of the old wound, about the size of a small egg. Dr. Bryden lanced it and drained it with tubes. I remained in the hospital at Armidale for about three weeks. I went back home to Murwillumbah and saw Dr. Pritchard and he dressed the wound for me for a couple of weeks. I was in Wootton Hospital about May, 1928, and the wound was then open. I was there for about three and a half weeks. The wound has broken down twice since then. The doctor never told me about the needle. I first knew about it when I saw Dr. Sear's X ray.

Cross-examined by Mr. Feez: I recognize that the illness for which Dr. Pritchard attended me was a very, very serious illness.

All the probing he did was to put in a little bit of gauze? No, he used to sit at the back of me and probe it with different probes.

You could not see, of course, what he was doing? I could feel, and I knew. The last thing he did was to put the end of the probe in it and put the gauze in to finish up the dressing. Before he did that he probed and probed at it continuously. While I was convalescing and able to go to his surgery, he would pull down the electric light over my back and probe and probe away.

Reexamined by Mr. Shand: Dr. Pritchard has not sent me a bill yet. I had asked for one before I found that there was a needle in me.

RACHEL REBECCA HAIR: Is he a much changed man from what he was before that illness? He is not so strong; he cannot do his work the same. He may look better, but he knocks up very quickly. The doctor was very attentive to him and after the operation my husband recovered wonderfully; after the first week or so.

Is it not a fact that he was never really well for years? He never complained. He had most violent fits of coughing. He used to cough very much in the morning. He used to bring up phlegm. I did smell the pus the doctor took away; it was very foul.

GORDON HASTINGS HAIR (*examined by Mr. Shand*): Do you consider it correct practice for a man to use one of those exploring needles to draw off pus from a cavity? No, I do not consider it so.

What is the ordinary practice? The ordinary practice is to use that apparatus simply for diagnostic purposes, to prove the presence of pus.

It is suggested here that the needle was detached from the syringe while the syringe was being emptied and left in the body. What do you say to that practice? I think it is wrong.

When you are using one of those exploring needles, would you either detach it or leave it in the body? No.

Take when you are probing the pleura for fluid, what do you do when a man is about to cough? Withdraw the needle at once.

How do you know—is there any sign you get? One must always be ready for it; it is part of your work to be ready for it and anticipate it, and generally, or there is a slight inspiration—you get that first.

Assume that the doctor lost the needle—he knew it was in a patient's body, in his pleural cavity—what was the proper thing to do at once? Immediately inform the patient or the nearest responsible relative; secondly, advise immediate consultation with another medical man and an immediate X ray to be taken.

If an X ray had been taken within a short period, what would have been the chance of getting it? Every chance, it would have been recovered.

Can you express an opinion whether that needle is likely to move? It is the usual thing for needles to move.

Cross-examined by Mr. Feez: Your brother you know has been suffering from bronchiectasis? Yes.

Had you any conversation with your brother, Dr. Manning Hair, about your brother's case? Yes.

Did your brother tell you what Dr. Pritchard had written to him? No, I did not know that he had written.

Did he not show you a letter he got from him? No, not until Sunday last; it was absolute news to me.

HERBERT ROY SEAR: I took a radio picture of plaintiff on April 2, 1929. I saw a foreign body which I thought was probably about two inches of a needle. It is completely inside the lung. I also took certain "Lipiodol" X rays later on which disclose bronchiectasis in both lungs.

The Judge's Summing-Up.

In his summing-up Mr. Justice Ferguson said:

Gentlemen, the plaintiff seeks to recover damages against the defendant for an injury which he claims to have suffered through the negligence of the defendant. He says that by reason of that negligence a needle broke into his body and was not removed, and that in consequence he has suffered damage of various kinds. It lies upon the plaintiff to establish that to your satisfaction, and you will understand that it is not an action in which we are inquiring as a medical board might, and it is not a question of punishing the doctor for something he has done, it is a question of compensating the plaintiff for the injury he claims to have suffered.

Negligence is, as Mr. Shand has put it to you, the doing of something which a reasonably prudent man would not do, or leaving undone something which a reasonably prudent man would do. That is to say the standard which you have to apply is the standard of the reasonably careful man, and of course in the case of a doctor he has the further standard that he must not fall short of reasonable professional skill. No man has the right to practice as a doctor unless he is possessed of reasonable skill in his profession, and if he has reasonable skill, it is his duty to use reasonable care in the exercise of it. To elaborate that a little, Mr. Feez is quite right in reminding you that the application of that standard eliminates the idea that a doctor can be found guilty of negligence if he does not show the skill of the very highest practitioner. I suppose there is no reason why one should not use the name that he used, you cannot expect every surgeon to be a MacCormick, but still a doctor exercising his profession has very serious responsibilities, and a failure by him, or a mistake by him, may have very serious consequences for his patient, and that makes it in the highest degree important that he should not be negligent in any degree, that he should not allow his conduct to fall short of that standard of reasonable care which is imposed upon a man by the very fact that if he falls short of it he may do incalculable damage.

The case is a little complicated by the fact that there are two separate operations, if I may use the expression, that you have to bear in mind here. There is the major operation, that is the operation in which the rib was resected, and the pleural cavity was drained, and there was the preliminary operation, the exploring operation. As far as I can see no complaint at all is made about the doctor's conduct in the performance of the main operation. He performed the operation in the way in which it is ordinarily done, and there is no suggestion that it was not done with competent skill, and the result of it was, if we accept the evidence of some of the doctors, probably to save the patient's life. Admittedly he has been for years suffering from this disease, bronchiectasis, and it is common ground that that is a serious condition. Then that was complicated apparently by some pneumonic condition, followed by that exudation of pus into the pleural cavity, that is what they call empyema, and apparently the only proper way to treat that, if the patient's life was to be saved, was to do what the doctor did, that was to make an opening between the ribs, and to insert a tube and drain it, and that was done, and that wound healed. But however successful that may have been the plaintiff is still entitled to complain, if there was negligence in the preceding operation, that is the exploratory operation, only you have to bear carefully in mind the distinction between the two, because of course whatever unfortunate results may have followed may in the ordinary course have followed either from the disease that he was suffering from or from the operation for empyema. For those things the doctor is not liable, and that is one of the features in the case to which counsel on both sides have directed most of their attention. You start with the admitted fact that the needle is in the lung; the question is what evil results have followed from that to the plaintiff. If no evil results have followed, then he has no claim for damages. If any evil result has followed, then he has a claim for damages, if he can show that that needle is in the lung because of the defendant's carelessness or negligence. So the question divides itself into those two questions, have any evil results followed to him from the presence of that needle in his lung, and if so, was that due to the defendant's carelessness. If you come to the conclusion that it was, then of course you have the further question, what amount of damages would be reasonable compensation to him for what he has suffered, and what he has lost in consequence, and I think it might be convenient if I took that question of damages first.

I will deal with the question of the damages following from the presence of the needle in the lung, independently altogether of how it came there, and then deal with the question whether or not that was due to the defendant's carelessness, and I will ask you to remember, gentlemen, that I have practically finished with all the law on the matter.

The Jury: May I ask a question?

His Honor: Yes.

The Jury: Supposing every care had been taken and through some error of judgement the doctor did something which may have harmed the patient, what is the position?

His Honor: I hope to deal with that, but remind me if I do not deal with it.

I will go back a little and I will give you some dates. The operation was performed on the 13th January, 1928, then a few days later, according to the plaintiff, the doctor told him that there was what is called pocketing, or the doctor says there was some pocketing in the neighbourhood of the wound, and the doctor admittedly made a second incision which he says, and the nurse says, was a very slight incision to let out some pus. The patient said it was that incision of which you see the second mark. The patient was treated by the doctor for a few weeks up to the 10th March, 1928. The 10th March, 1928, the doctor says was the last treatment he gave him before he went away. Then he went down to Sydney and up to Blackheath, and there the wound healed, and in April, 1928, he came back to Murwillumbah. In May he left for Roma, and he stayed in Queensland until July, when he says he

came back feeling much better and in quite good health. That is the plaintiff's account of it. Mr. Shand tells you that for that period they claim no damages, all that was what you might reasonably have expected as the result of the illness the plaintiff had suffered, and the operation that was necessarily performed on him. Then in October or November, the plaintiff complained again of pains in the back and went to the doctor for further treatment which continued until February, and early in February, 1929, he started for Sydney, he tells you, but on the way stopped at Armidale, and being ill there he went to the doctor, and he was treated for a little while there, and an abscess the size of a small egg formed on the site of the old wound. The doctor opened this abscess and put in some dressing, and he was three weeks in hospital, and then in March returned to Murwillumbah. Then shortly afterwards, on Easter Saturday, he came down to Sydney to the Wahroonga sanitarium, he saw his brother, Dr. Hair, and on Easter Tuesday an X ray was taken. That is early in April, and those are the first X rays. Then he was three weeks in Wahroonga sanitarium, three and a half weeks in Wootton under Dr. Poate, then he spent a week at Summer Hill hospital, and then went away to Forbes and was with his brother for eight weeks doing well, the wound having healed, and was about to leave for home when he got the offer of a trip to Bourke. His brother recommended him to take the trip, he said he thought it would do him good, and he went and was away from Sunday until Thursday, and came back ill, and then went down with double pneumonia from which he nearly died. The wound became active again, the brother had to open it and treat it again, and so he remained there until the end of August, when he returned home. The wound was then healed, that is in August, 1929, and it continued healed until March or April of this year, when it broke out again, and did not heal until the 1st May. That is the outline of his history.

The plaintiff's case is that but for the needle being in his lung, the healing when he was down at Blackheath should have put an end to all his troubles, it should have been final, and there should have been no recurrence of it. The reason why it has opened and reopened since is the presence of the needle in his lung.

The case for the defendant is that this reopening of the wound has nothing to do with the needle in his lung, that it is the ordinary natural result of the original trouble, that it is a common thing, and a usual thing, for that kind of trouble to recur, that when you have had empyema, and particularly when it is complicated by or is caused by bronchiectasis, then you expect it to recur from time to time, and you expect that the original cause is still operative, and if pus is formed then this breaking out of the wound or this opening up on the wound is Nature's safeguard against much more serious trouble.

If you come to that conclusion, or if the plaintiff has not satisfied you that this recurrent reopening of the wound is due to the needle, then of course the defendant, whether negligent or not, is not responsible to him for the suffering he has undergone, and the expense he has incurred in respect of those occurrences.

Still there remains, and I think Mr. Shand very properly put it to you, another aspect of the case, and that is assuming that this reopening of the wound is not due to the needle, still you have the fact that the needle is there, and Mr. Shand puts it to you, and it is a matter for your consideration, whether or not the mere presence of the needle is not of itself a very serious detriment to the plaintiff.

I just want to say now, gentlemen, what I was about to say when I interrupted myself. You will understand that I am dealing with questions of fact upon which you and you only are the judges, that my function is merely to do what I can to put before you the material which I think you might and ought to take into consideration in forming your judgement, but I do not presume to dictate to you or even suggest to you what conclusion you should arrive at. All the questions that I am putting to you now are questions of fact in respect of which you are the sole judges. Supposing you are satisfied with the evidence of the doctors, that this needle is not doing any harm, and is not likely to do any harm, still if the plaintiff is himself not satisfied of it, then the position is that whereas before January, 1928, he had not this in his lung, now he has something which is, or may very reasonably be a source of considerable trouble and concern to him. The defendant's case itself is that the reason for not telling a man that he has got this sort of thing loose in his body is that it may do him harm, that the mere knowledge is likely to do him harm, it is likely to retard his recovery, it is likely to set up a condition of mind which may help to make him ill. If as a result of the needle being there the plaintiff has to go through life with a reasonable apprehension that it may do him harm, then to that extent he is being done harm, he is being injured, he has lost some of the enjoyment of life by reason of the needle being there. So that apart altogether from any question of actual physical injury being done to him by the needle, you are entitled still to take into consideration that aspect of it, that the presence of the needle there may be affecting his enjoyment of life, and may in fact have at some time or other a serious effect upon his health. So that in that sense there may be disagreeable results and harmful results from the mere presence of the needle, apart from any physical effect that it may have upon him. That is a matter you have to consider if you come to the question of damages.

It is for you to say whether you are satisfied that the recurrent opening of this wound is due to the presence of the needle. As to that you have on the plaintiff's side the evidence of his brother. On the other side you have a large body of evidence of doctors whose names I suppose are familiar to most of us as men holding very high positions in the medical world. As far as the defendant himself is concerned, naturally, without saying anything to his discredit, he must be biased. We are all biased in matters in which we are concerned. So far as any opinion that he would express is concerned, you would probably look upon it subject to that possibility of bias. It is put to you on behalf of the defendant that the plaintiff's brother is also, from his association with the plaintiff, likely to be biased, he may not be a perfectly disinterested witness. Then come the doctors who were called for the defence, and Mr. Shand puts it to you that they have a bias so strong, that you ought to discredit their evidence, arising from the fact that they are brother members of the same profession as the defendant. Gentlemen, that raises a question that you have to consider, and not I, whether these gentlemen, whom you have seen in the box for the sake of helping a brother doctor have stated what they do not believe to be true. It would be an appalling thing, if a man who had a cause of action against a medical man was defeated by reason of a combination of other medical men to deceive a jury, or even if they were so biased by their professional association that they could not be trusted to give honest evidence or trustworthy evidence. That is one of the questions that you will have to ask yourselves, whether you believe the evidence which men like Dr. Poate, Dr. McKelvey, Dr. Scot Skirving, Dr. Smith, and the others gave, whether their evidence is so untrustworthy that you should discredit it, and when they have expressed a professional opinion, whether you should prefer the opinion of the plaintiff's brother. Of course it is a matter entirely for you, and it may be that considering all the circumstances you think his evidence is more trustworthy, but that as I repeat, is a matter entirely for you. He expresses the opinion on which the plaintiff's case is very largely based that but for this needle the trouble would not have occurred. You have the evidence of doctors called for the defence that as far as they can judge the needle has nothing to do with the recurrence of the trouble, that it has reached a position in the lung which is in all probability its final position, there is no reason for expecting it will ever move, and that there it is, in their experience, not doing any harm, and that any ill results that have followed to him have nothing whatever to do with the needle. The defendant tells you that after the plaintiff got back from Armidale he probed the wound and found that the probe went upwards to the upper part of the lung, and that indicated that the source of the injury was in that direction, and that it did not go in the direction where we now know the needle is. Dr. Poate gives you the same evidence, he also probed it, and he expresses

the opinion now that he says he expressed to the plaintiff at the time, that the needle had nothing to do with it. He says the probe did not go towards the needle, it went away, but Dr. Poate admitted, as Mr. Shand has pointed out, and I understood his evidence to mean this, that that was not an infallible guide, because a sinus may branch, it may be going in one direction at one time, and another at another, but still in his opinion this sinus did not lead towards the needle, and if it did not come from the needle, then the needle was not the cause of that outbreak of the wound.

So much, gentlemen, for that. I don't think I need deal any further with the evidence which bears on the question whether or not the needle is causing any trouble. If you accept the opinion of Dr. Hair it is causing the trouble, and if you accept the opinion of the medical men who have given evidence for the defendant, it has nothing to do with the trouble.

Now supposing you come to the conclusion that it has, or in any case supposing you come to the conclusion that the presence of the needle there is a substantial detriment to the plaintiff, whether it is causing that trouble or not, then, of course, comes the main question for your inquiry whether you are satisfied that the needle is there today because of the defendant's negligence, that is by some negligence on his part it got there originally, or by some negligence on his part it was not removed. Dr. Hair puts it to you that there are several respects in which the defendant failed to take the care which he says should have been taken by a doctor in his position. First of all he says that it was not enough for him to examine the needle with the eye and to see that it was clean and apparently free from flaw, but it was his duty to put a strain on it by slightly bending it, which, if there had been a flaw, might have resulted in it breaking outside the patient's body instead of inside. Dr. Pritchard, who has had a very large experience, says that in his experience it is not necessary to do anything of the kind. The other doctors who have been called, some say they do it, and others say that in their opinion it is dangerous to do it, that a needle which is going to be pushed right into the body ought not to be subjected to a side strain at all, and if you submit it to a bending strain, and there is a flaw there, and if you just do not break it, it may be that you have weakened it to such an extent that it may break when you are putting it in the body. At any rate there are several doctors who tell you that in their experience it is not a necessary thing, and some of them say that in their experience it would be increasing the risk instead of diminishing it. The question for you is not what I think I might call an engineering question, whether it would or would not be an increase of risk, but whether a man who does not do it and who has not been in the habit of doing it, whose professional colleagues are not in the habit of doing it, if you believe them, whether he is negligent, whether he is using something less than ordinary care if he does not do it. If he honestly believes that it is better not to do it, then is it negligence on his part not to do it? But of course the question for you is whether he does honestly believe it, and whether his neglect to do it was a piece of negligence on his part.

Then the next negligence which is charged against him is, that when the needle was put in and got into the pus cavity, it was improper for him to take out more than one syringeful. Dr. Hair says that that is an improper thing, that once he discovered by withdrawing the plunger that there was pus there, his duty was to take out the needle at once, and then remove the pus by an operation, that it was an improper thing to draw it out into the syringe. You have had evidence of a number of other doctors who say that not only was it not improper, but that it is the usual practice and the proper practice, that once you have got your syringe in there and it is capable of withdrawing this fluid, then it is a good thing to use it for drawing out some of the fluid, it may be an ounce or such quantity as you saw there, or more, in order to diminish the tension, that the action that is going on in the patient's body is the pressure of this fluid upon the lungs, which is diminishing the air space in the lung, I suppose, and that it is a good practice, and not a bad practice to use the syringe in order to withdraw the pus. Some doctors have said they took twelve or fifteen syringes full out, and one of the doctors, I think it was Dr. Smith, said that after the war there was a body of opinion that that was the proper practice, to use your syringe, as I understood him, to take as much of the pus out as you could. However, there again, if there is difference in practice, then the doctor's duty is to do what his experience tells him is the best practice, and if he follows a practice which, according to the evidence, the great bulk of his fellow practitioners follow, practitioners of very high standing, then can it be said that in that respect he was guilty of negligence?

Then Dr. Hair says that it was wrong and exposing the patient to an unnecessary risk to detach the syringe. It is common ground that you cannot empty a syringe without detaching it, but he says that if you are only going to take one syringeful, you should take it out, and there should not be any emptying of the syringe, and as I understand his evidence his opinion is that that was the real cause of the breaking of the needle. He expressed the opinion that a cough would not break the needle, and he said the objection to leaving the needle in is that a cough might damage the lung, but he did not think a cough would break the needle. He said the risk of detaching the syringe was that you might put a side pressure on the needle and so break it. Dr. Poate said that he never worries about the patient coughing. Dr. Smith said that he would not withdraw the needle if he knew the patient was going to cough, as a matter of fact it does not hurt the lung, and it was Dr. Poate I think, who said that he has taken thirty or forty syringes full of pus or of fluid out of a patient. It is for you to weigh the evidence of Dr. Hair on the one side, and these other doctors on the other. Dr. Hair says that in his ten years' experience, and you must remember that during that time for nearly two years he held an important position in Prince Alfred Hospital, he was a junior resident medical officer for twelve months, and then for ten months or thereabouts was senior medical officer, so that he would certainly have a lot of very useful experience. Since then he has been in private practice, and he tells you that in his ten years of practice he has performed at least 100 operations for empyema. I will just read exactly what he says. He was asked about exploratory needles and he said he could not give an idea how many times he had used them. He says: "I can only say I ceased counting the number of times ten years ago, I have done it hundreds of times." Then he was asked "How many operations have you yourself conducted for empyema?" and he says "I cannot say exactly but at least one hundred." Then you have the evidence of the other doctors that that is a very remarkable experience. Dr. S. A. Smith says that he sees about three empyemas a year in his public and private practice. Dr. Poate says that at the Royal Prince Alfred Hospital there are twelve to fifteen operations in the year for empyema, and that is amongst a large staff of doctors, and that he has had himself three or four a year, although he specializes in lung surgery. Dr. Bell says he does not see half a dozen a year with his hospital appointments. Dr. Corlette said he heard of three cases last year, and Dr. McKelvey said he sees two or three a year. One is inclined to think that they must be talking of different things. However, Dr. Hair says he bases his opinion on that experience, and other doctors with enormously larger experience say that they do not see anything like that number of cases, and that even in the big hospitals there are not that number of cases.

Then there comes the question of not telling the plaintiff that the needle was there, or not taking an X ray. The defendant says that he deliberately abstained from telling the plaintiff because in his opinion it would do him harm, that when the needle broke it disappeared, and that when he operated within an hour or two, he put his fingers in and felt around and found no projecting needle. If the needle had still been in the chest wall, then he would have discovered it in that way. You will remember that the evidence seems to be that the skin is the toughest part of the tissue that the needle goes through. It is put to you that the skin is pressed in by the instrument during the

operation, as one witness said, so that it would reduce the thickness of the whole wall to something about the thickness of the rib, not much more, and then when the needle broke the immediate result would be that the skin would fly back and leave the end of the needle in the softer tissue beneath. The defendant says that he felt around. The nurse says that she saw him put his finger in and feel round, and he said that if the needle had then been there in the chest wall he could have discovered it in that way and could have taken steps to remove it. He said that he did not discover it, and so came to the conclusion that it had fallen and was probably in what he called the sulcus, the fold at the bottom where the two parts of the pleural membrane bend. He said he assumed it was down there. At any rate in his view the patient was in a dangerous condition, and the important thing, having discovered there was this large amount of pus there, was to have him operated upon at once and get that pus removed. He said he immediately made arrangements for the operation, and he operated. Other doctors have told you that in their opinion that was as much as a man could do, that was a reasonable thing to do, that if it had disappeared, it was no use hunting for it, that operating for it then was out of the question, and that it would have been dangerous to the plaintiff to operate, that an X ray might have shown you where it was, but that if it was not sticking in the chest wall, then if an X ray showed that it was somewhere else, it would be dangerous to operate. That is their view. Dr. Hair says that if an X ray had been taken, in his opinion it would have been found sticking either in the chest wall, or it might be in the lung, protruding from the lung the other side, and that it might have been possible, and in his opinion it would have been possible, to recover it then.

Then as to telling the plaintiff, some of the doctors say definitely they would not think of telling the plaintiff, it would not do any good, and it would simply do harm, it would set up a condition of mind that would be harmful to him. Other doctors say they would not tell him, but they would tell some near relative whom they could trust—I suppose in this case it would be the wife, or possibly it might have been one of his brothers. Dr. Benjafield says that he simply would not tell anybody, that telling a near relative is in his opinion much the same as telling the patient, because it would be pretty sure to get to his knowledge, and he thought no good could come from letting him know, that it would only have a bad effect upon him. There again it is a question for you, not whether you think the plaintiff ought to have been told, but whether you think the failure to tell him was something more than a mere error of judgement, whether it was failure on the part of the doctor to do his duty, whether it was negligence on his part. If you believe that he honestly thought it would be harmful to the plaintiff to tell him, then, can you say, and it is for you to say, whether you think notwithstanding that he ought to have told him at the risk of doing him harm. It is a responsibility, a serious responsibility, but as one of the doctors said they are there to take responsibility. If he thought that it would be beneficial to the plaintiff to know that it was there, then it was his duty to tell him whatever the results might be to himself, even if he had to admit that he had had an unfortunate accident. If he believed it would do the patient harm to tell him, then the question for you is whether he still should have told him.

I think, gentlemen, those are the matters in respect of which the contest has taken place before you. It has been suggested on the one side that the defendant was guilty of negligence, and on the other side that he did what a prudent doctor of great experience would do. There is one matter to which I think it is right to refer, because in a case of this sort, very much depends upon the credibility of the witnesses, whether they are giving evidence of facts, or evidence of opinion, and that is in regard to that second incision. The wound has been opened, once at Armidale, and again it was opened—I don't think it needed opening when he was down at Wahroonga, or in Dr. Poate's hospital—but it was opened again by Dr. Hair at Forbes, that is after the pneumonia. It is not suggested that that second incision was made by Dr. Hair, but it is suggested that the incision may have been the incision made by the doctor at Armidale. That doctor is not called so we have not the benefit of his evidence. Dr. Pritchard tells you positively that he did not make that incision, that there was no occasion to make that incision, that the only incision he made, except the main incision, was merely opening a small abscess that was in the neighbourhood of the drain, and he is borne out in that by the nurse. It is suggested that as a matter or fact his evidence on that point is not true. If it is not true, it means that he is for some reason or other attempting to mislead you, or that his memory is at fault. The same thing applies to the nurse. It is suggested that he made this incision in the hope of recovering the needle a few days after, when the patient was getting over the main operation, and he had made an unsuccessful attempt to recover the needle. He says nothing of the sort took place, and the nurse says nothing of the sort took place, but Mr. Shand puts it to you, and it is a matter for your consideration, that if the doctor at Armidale had opened the abscess at some other point than by cutting down on the old scar, then that would have been obvious to the defendant when he was dressing the wound a few days later, or a few weeks later, and the defendant does not say that he saw anything of the kind then. Of course if you come to the conclusion that in connexion with that the defendant for some reason or other is wilfully misstating what took place, that would be a matter which you would take into grave consideration when you are dealing with the trustworthiness of his evidence throughout. Mr. Feez has reminded you that one doctor who made an examination of the plaintiff on his behalf was Professor Mills and that Professor Mills has not been called, and he asks you to draw the conclusion that Professor Mills's evidence would not have been of any service to the plaintiff, or he would have been called.

I don't think there is any other matter to which at present I can usefully draw your attention, except possibly this, dealing with the question whether or not the recurrent opening is due to the needle or not. We have the fact that a needle or other foreign body is not necessary to cause empyema, because apparently the original empyema arose before the needle was there, so that there was some cause in the body which gave rise to the original empyema. Then what the medical witnesses for the defendant say is that if it was the needle doing the damage, then once it began to be really operative, it would have affected the plaintiff's general condition much earlier, that if it was going to do harm, it would have done harm much earlier than it did, and that when it started, some of them said, probably it would have gone on doing harm as long as it remained there.

Then the only other thing that I would like to deal with is the question that one of you gentlemen put to me, and that I take it was this, that supposing the doctor made a mistake——

The Jury: Had used every care and through an error of judgement had done something which did harm.

His Honor: Yes, had used every care and made a mistake, then that is not negligence. All of us are liable to make mistakes, and if a man does the wrong thing, although he is using every care to do the right thing, then that does not make him liable for negligence. Negligence is not using care, and if——

The Jury: The finish of that is, supposing the error of judgement, or whatever you like to call it causes harm to the patient.

His Honor: Then if it is a mere error of judgement, and he is doing his best, he is exercising care, and makes a mistake, he is guilty of an error of judgement, but that is not negligence.

The Jury: Would not you class that as unskilful treatment?

His Honor: What the doctor must start with is a competent knowledge. It does not mean that he will do everything skilfully. He must be reasonably competent, but even so he may make mistakes, but it is not unskilful treatment that renders him liable, it is not using the skill that he has with due care. If he exercises due care, that is not negligence. I think that sums it up, because every

time a man makes a mistake it may be unskilful. Take a case that we commonly deal with here, a case of negligence in driving a motor car. We constantly have to remind ourselves that a man in a case of emergency might do the wrong thing, but still if a reasonably prudent man in his position might do the same wrong thing, then that is not negligence. You have to remember that a doctor dealing with a patient is not in the same position as a carpenter mending a damaged piece of furniture. He can take his time, and if he spoils a piece of wood he can get another one and put it in and so on. A doctor has to deal with the condition of a patient as a whole, he must work in the dark, he must draw conclusions which are based upon his experience and knowledge, and if doing his best he draws a wrong conclusion, if he does what on fuller consideration he would see to be the wrong thing, or if he does what a more skilful man would not have done, still none of those things amount to negligence, provided he has exercised due care.

If you come to the conclusion that the plaintiff is entitled to damages then you will give him a verdict for such an amount as you think would be reasonable compensation to him for the injury that has resulted from the defendant's negligence. Mr. Shand admits that one part of the case has not been adequately put before you, and I think it is a pity it was not. One part of the plaintiff's claim, and a very proper part of his claim, if he is entitled to damages, is that he should be reimbursed for the expense he has been put to in consequence of the defendant's negligence. So far as his out of pocket expenses are concerned, that is a thing that might have been proved and ought to have been proved pound by pound. A man who says "I am £400 out of pocket by this," ought to come prepared to show how he is out of pocket. He should be able to say "I paid so much to the Wahroonga hospital, so much to Wootton, so much to Dr. Poate, I spent so much on a journey which the doctor advised me was reasonably necessary in order to regain my health," and so on, but all the plaintiff does is to say "Well, it cost me £400 or over £400" but he has not given you an opportunity of checking that in any way, he has not told you the items going to make up that amount in order that you might see how far they are properly attributable to the injury of which he complains. However, it is obvious that if this is breaking out and the wound is the result of negligence on the part of the doctor, then the plaintiff has been put, and must necessarily have been put to considerable expense, but he has left that very much at large. Still it is for you to judge as far as you can, if you come to that part of the case, what you think would be reasonable compensation to allow him for that. Then if you are of opinion that the needle is the cause of this breaking out which has taken place from time to time, and if you accept Dr. Hair's evidence that it is likely to go on breaking out possibly as long as he lives, that means that he has a prospect of a series of very unhappy occurrences which are going to recur we do not know how often, and which will probably involve him in considerable expense. If you are not satisfied that these recurrent outbreaks are anything more than the natural outcome of the original condition, and if you are not satisfied that they have anything to do with the needle, then of course comes the other question, what damages you think a man is entitled to for the mere fact that he has a needle in his body, if you are satisfied that that needle is there through the defendant's negligence. You will consider all the circumstances. If the plaintiff has satisfied you that the defendant was negligent, and that he has suffered in consequence then you will give him such damages as you think will reasonably compensate him, not only for what he has gone through, but what it is reasonably likely he may go through in future. If he has not satisfied you then you will find a verdict for the defendant.

Mr. Shand: Your Honor referred to the negligence which we charge, but Your Honor forgot to mention that one of the charges was that this needle should have been held in the hand, and should have been held when it was detached.

His Honor: I did not refer to it because some doctors have expressed the opinion one way and some another. Of course if you come to the conclusion again that the proper practice was to continue to hold that needle in the hand, and that it was negligence not to do it, that is to say that the defendant should have been so well aware of the necessity of holding it in his hand, and that it was only carelessness which prevented him from holding it in his hand, and if you come to the conclusion that not holding it in his hand was the reason for it breaking, then that again might be a ground on which you might find him guilty of negligence.

Consider your verdict please, gentlemen.

At 3.55 p.m. the jury retired.

At 5.25 p.m. the jury sent in the following question:

(1) Could we find a verdict for the plaintiff on the following terms:

> "The jury find that the defendant has been guilty of some negligence, but have not sufficient evidence to show that any damage has resulted therefrom, or is likely to."

His Honor recalled the jury.

His Honor: The question for you is, is the presence of the needle in the plaintiff's lung due to negligence on the part of the defendant. If not there must be a verdict for the defendant. If it is, then has the defendant suffered any damage by reason of the presence of the needle. If so he is entitled to a verdict.

At 5.30 p.m. the jury returned into court, with a verdict for the plaintiff in the sum of £100.

Correspondence.

RADIUM DOSAGE.

SIR: An error has crept into the estimation of dosage given by Dr. Bernard Dawson in a case recorded in your number of July 19.

Dr. Dawson states that twenty milligrammes of "radium bromide" were placed in the patient's uterus for twenty-eight hours, and further on he gives the dose delivered as 560 milligramme-hours. This is not so. Radium bromide in its anhydrous form contains only 58·61% of radium element, so that only 328 milligramme-hours (approximately) were given.

It is probable that the mistake is a mere slip and that what was meant is "twenty milligrammes of radium element in the form of bromide," but it illustrates the danger of referring to the radium salts in dosage. If the patient received only 328 milligramme-hours with a filter of one millimetre of platinum, it is in my opinion doubtful whether such a dose would materially influence the menorrhagia.

Yours, etc.,

H. M. MORAN.

171, Macquarie Street,
Sydney.
July 18, 1930.

Obituary.

JOHN IRWIN MOORE.

WE regret to announce the death of Dr. John Irwin Moore which occurred at Brisbane, Queensland, on July 29, 1930.

Books Received.

CHURCHILL'S EMPIRE SERIES: TROPICAL MEDICINE, by Sir Leonard Rogers, C.I.E., M.D., B.S., F.R.C.P., F.R.C.S., F.R.S., and John W. D. Megaw, C.I.E., V.H.S., B.A., M.B., B.Ch., B.A.O.; 1930. London: J. & A. Churchill. Royal 8vo., pp. 544, with illustrations. Price: 14s. net.

PRACTICAL MEDICINE SERIES: NERVOUS AND MENTAL DISEASES; Edited by Peter Bassoe, M.D.; Series 1929. Chicago: The Year Book Publishers. Crown 8vo., pp. 440. Price: $2.25 net.

RECENT ADVANCES IN DISEASES OF CHILDREN, by Wilfred J. Pearson, D.S.O., M.C., D.M., F.R.C.P., and W. G. Wyllie, M.D., M.R.C.P.; Second Edition; 1930. London: J. & A. Churchill. Demy 8vo., pp. 558, with 20 plates and 34 text-figures. Price: 15s. net.

THEORY AND PRACTICE OF NURSING, by M. A. Gullan, S.R.N.; Third Edition; 1930. London: H. K. Lewis and Company Limited. Demy 8vo., pp. 262, with illustrations. Price: 9s. net.

ESSAYS AND ADDRESSES, SOCIOLOGICAL, BIOLOGICAL AND PSYCHOLOGICAL, by A Surgeon; 1930. London: H. K. Lewis and Company Limited. Demy 8vo., pp. 292. Price: 10s. 6d. net.

VISIT OF PROFESSOR J. T. WILSON.

GRADUATES are reminded that a conversazione will be held at the Medical School, University of Sydney, on Friday, August 29, 1930, in connexion with the visit of Professor J. T. Wilson. Those intending to be present are asked to communicate with the Honorary Secretary, Dr. J. G. Hunter, British Medical Association House, 135, Macquarie Street, Sydney.

Diary for the Month.

AUG. 11.—Queensland Branch, B.M.A.: Medical Section.
AUG. 12.—New South Wales Branch, B.M.A.: Ethics Committee.
AUG. 14.—New South Wales Branch, B.M.A.: Clinical Meeting.
AUG. 14.—Victorian Branch, B.M.A.: Council.
AUG. 19.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
AUG. 22.—Queensland Branch, B.M.A.: Council.
AUG. 26.—New South Wales Branch, B.M.A.: Medical Politics Committee.
AUG. 27.—Victorian Branch, B.M.A.: Council.
AUG. 28.—New South Wales Branch, B.M.A.: Branch.
AUG. 28.—South Australian Branch, B.M.A.: Branch.
SEPT. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
SEPT. 2.—New South Wales Branch, B.M.A.: Post-Graduate Work Committee.
SEPT. 3.—Victorian Branch, B.M.A.: Branch.
SEPT. 4.—South Australian Branch, B.M.A.: Council.
SEPT. 5.—Queensland Branch, B.M.A.: Branch.
SEPT. 9.—New South Wales Branch, B.M.A.: Ethics Committee.

Medical Appointments.

DR. H. S. Roberts (B.M.A.) has been appointed Government Medical Officer at Nambour, Queensland.

* * *

Dr. F. G. Connolly has been appointed Official Visitor to the Hospitals for the Insane at Goodna and Ipswich, Queensland, pursuant to the provisions of *The Insanity Act of* 1884.

* * *

Dr. G. F. Lumley (B.M.A.) has been appointed to act at the Port of Sydney, New South Wales, as Medical Inspector of Seamen, pursuant to the provisions of Section 123 of the *Navigation Act* 1912-1926.

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Dr. F. H. Beare (B.M.A.) has been appointed an Honorary Commissioner to inquire into and report upon the treatment of infectious diseases in Great Britain and the Continent of Europe.

* * *

Dr. N. S. Solomons (B.M.A.) has been appointed Government Medical Officer at Mittagong, New South Wales.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii.

AUSTIN HOSPITAL FOR CHRONIC DISEASES, HEIDELBERG, VICTORIA: Resident Medical Superintendent.
HOBART PUBLIC HOSPITAL, HOBART, TASMANIA: Radiographer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company, Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Mount Isa Hospital. Boonah Hospital.
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